THE ENGINEERING AND MINING JOURNAL

Submarine Coal Mining.

BY A. SELWYN-BROWN.

An order recently issued by the chief inspector of coal mines, New South Wales, restraining the manager of the Stocton colliery, Newcastle, from carrying on any further mining operations under the Pacific Ocean, in that part of the workings known as Garrett's district, attracts attention to the thickness of cover problem. For some time miners in the Stocton mine complained of the apparent thinness and insecurity of the cover. Sounds from vessels on the sea and the clanking of chains and dropping of anchors were distinctly audible in the workings. An examination of the roof made by boring disclosed the fact that only an 80-ft. cover of coarse-grained sandstone separated the coal seam from the alluvium on the floor of the sea above. The alluvium was found to be about 145 ft. thick. The bore was cased with an iron tube, and fitted with a valve to control the water in the tube. On opening the valve a quantity of water flowed, and afterward ceased to run. This water, it was surmised, was standing in the tube or pipe, and the fact that it ceased to run after a while was regarded as due to the tube being plugged with the alluvium lying on the bed of the ocean, and on top of the 80 ft. of sandstone cover on the coal seam. The absence of a flow of water also indicated an absence of water pressure on the tube.

The Coal Mines Act requires that there shall be a minimum cover of 120 ft. between the coal seam and any body of water overhead. The chief inspector of coal mines and his officers considered that the 150 ft. of alluvium on top of the 80 ft. of solid sandstone should not be taken into consideration, when calculating the minimum cover. Alluvium is not impermeable. Water flows through it as if it were a sieve, hence the officials in question determined not to incur any further risk of a disaster, and, as above stated, the manager was ordered to cease operations in Garrett's district.

The minimum cover of 120 ft. of solid strata while working under the ocean, was adopted in accordance with the English law. That compulsory minimum was fixed upon, owing to a disaster occurring in an English coal mine working a seam under the North German Ocean. The miners were working with a 90-ft. cover, when the sea broke in and drowned nearly 100 men.

Submarine coal mining is carried on to a considerable extent in England and on the Cape Breton fields, Nova Scotia, where the outcrop of the coal measures follows the coast line, and the dip is about 7° seaward. The accompanying table gives the chief particulars of typical English under-sea workings:

This table exhibits a wide variation in depths of cover. The legal minimum thickness is well exceeded in all the mines. The minimum in the Cambois is 360 ft., and whenever the cover in the Cowper varies between 300 and 400 ft. the adoption of the long-wall system of working and the secure stone-wall packing are made compulsory. It is a well-recognized fact that a fixed safety minimum for general application is impossible. The proper thickness of cover must be separately fixed for each colliery. This can only be done after an exhaustive study of the different overlying strata and the general geological structure of the district in the immediate vicinity, combined with actual boring tests. The chief characteristics of a good cover are a compact, coherent impervious rock, undisturbed by faults and dikes; disturbed and contorted strata obviously require very careful attention.

Name of Mine.	Name of Sea.	Depth Below Bed of Sea in Ft.	Thickness of Seam, Ft.	Remarks.
Harrington.....	Irish Sea	130 to 168	6½	The minimum thickness of cover, 126 ft.; 32% of coal worked; pillars are left.
North Seaton....	German Ocean	270 to 570	5	Workings extend 1¼ miles from high-water mark; long-wall system used; all coal extracted.
Cambois.....	German Ocean	360 to 570	4½	All coal extracted.
Cowpen.	German Ocean	300 to 500	3 to 4	All coal extracted.
Seaham...	German Ocean	1,830	5	Workings extend 3 miles from shore; all coal extracted.
Ryhope.	German Ocean	1,830	7	Workings extend 3 miles from shore: all coal extracted.
Whitehaven.....	Irish Sea	1,200	10	Workings extend 3½ miles from shore; all coal extracted.

When the matter is reviewed it will be seen that for many years the Australian miners in the Stocton mine have been running dangerous risks. The sandstone formation overlying the Newcastle, N. S. W. coalfield is in places considerably faulted, and a cover thickness of only 80 ft. is much below the danger limit. A cover of that thickness would be liable to fracture through ordinary caving or from slight seismic disturbances. The smallest subsidence would let in the sea. It must therefore be conceded that the suspension of operations within the danger zone was what the circumstances called for.

Mechanical and Hand Firing.

The use of the mechanical stoker, as against hand-firing, has many advantages; the reverse of this proposition is also true. So much is dependent upon the men who operate, in the one case, and upon the men who fire, in the other, that no law can be established which will hold good for all times and places. Indeed, no law has yet been published that would apply to the same plant at different times. An interesting test (made at the plant of an electrical company using modern machinery) proved the mechanical stoker to be more economical than hand-firing, the saving effected being about 7%. The plant was fitted with horizontal return tubular boiler, operating at 135 lb. pressure; the engines were compound condensing, and induced draft was regularly used. The exhaust steam from the stoker engine and the pumps was used for heating the feed water.

Another test of the same plant, under the same conditions, was made within a year from the first test. Moreover, the test was made by the same men, the only change being in the personnel of the firemen. Yet this showed within a fraction of the same percentage in favor of hand-firing that had been shown previously for mechanical stoking. Neither of the tests were "doctored"; in neither case had the company any axe to grind; the firm which built and paid for the plant owned and operated it as a business proposition; the results are not open to question. Even the coal was from the same district, and had about the same moisture, composition and calorific value. The efficiency of the firemen was practically the only variable quantity. When the interest on the first cost is added to the cost of operation of the stoker equipment, the total would probably be enough to enable the payment of sufficiently higher wages to secure the most expert firemen and effect a corresponding economy in operation.

In firing coal by hand, a large power station (which has been economically operated on that basis) uses the greatest care in checking up the fuel and water charges. The firemen shovel from their individual piles of coal; this is first dropped through a weighing chute, where the amount drawn out is registered. The water-tender (who also takes the meter readings) keeps account of the coal used by each man as well. The figures are posted weekly, and the men know that those with the best records will be selected for promotion. This practice has its effect in increasing the efficiency of the firemen, and has also resulted in a better economy at the coal pile.

Imports of diamond dust, or bort, into the United States for the nine months ending Sept. 30 were valued at $366,651; a decrease of $111,123 from last year.

Notes on Death Valley and the Panamint.

BY GEO. D. JAMES.*

My trip to this region was made in behalf of Eastern investors. On Sept. 13, 1905, I left Reno for Keeler (a 334-mile run on the Carson & Colorado railroad) in the morning. The elevation of Reno is

ON THE DESERT.

4,501 ft.; the country from Reno southward consists of a barren, sandy desert; Wabuska was reached in five hours. This is 249 miles from Keeler (329 miles from San Francisco), with an elevation of 4,344 ft. Leaving Wabuska, we passed Schurz, an Indian reservation, 222 miles from Keeler, at an elevation of 4,250 ft. Walker lake was skirted, a large extent of water, and Stone's camp, on the east of which are large porphyry dikes. Passing Luning station (4,605 ft.) brought us to Sodaville (156 miles from Keeler), which, with the junction of Mina, is the changing point for Tonopah and Goldfield. Summit was reached at midnight, the elevation being 7,220 ft., as we entered a rougher country, with sharper curves and steeper grades; the road from Mina south is narrow-gauge and down-grade. All the scenery was lost in slumber until sunrise, when Citrus (the station for Independence, the seat of Inyo county, Cal.) was reached; we arrived at Keeler in less than 24 hours from Reno. The accommodations at Keeler were satisfactory. The air was fresh, after a rainstorm also, which sometimes occurs in that portion of the country. After breakfast I left for Darwin.

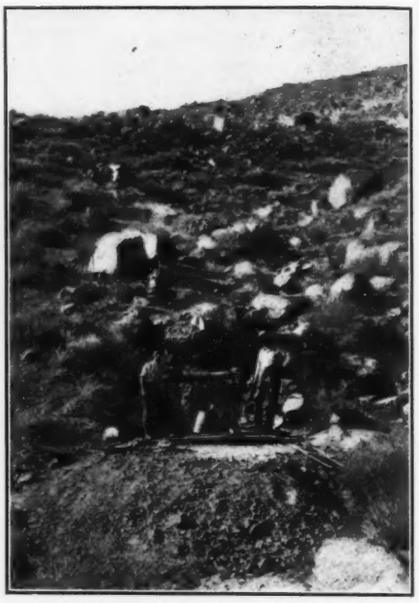
On the way a vast lava bed was encountered; the lava is varied, black and red, but all tending to show the intensity of past disturbances. I would infer that Owens lake (together with the surroundings—Keeler being situate to the east) is in an immense crater now filled with water, being 8 miles wide by 20 miles long. Having no outlet, it has become highly charged with minerals; its water has a sp. gr. of 1.76, and is impregnated with carbonate, chloride and sulphate of sodium, and sulphate (and silicate) of potassium. This water has rare cleansing properties; medicinal values are also attributed to it. Its mineralized character has given rise to an important industry, the manufacture of soda; the liquid is run into acres of shallow vats, where evaporation by the sun leaves the residue, which is shoveled up by thousands of tons; later it is refined and marketed.

An investigation of the float and croppings showed primitive formations; granite and other Archean representations were noted, as also porphyry. It can be inferred that "true fissure veins" occur throughout this section.

About four miles beyond Keeler, a vein was noticed, having a trend from east to west, as plainly shown by the quartz float; in addition, there were several good indications, but no development. Farther on, a large iron dike appeared.

We arrived at Darwin at 5 P. M.; the next day I observed the surrounding situation. Messrs. Haggin and Hearst formerly operated properties here; but when silver fell in value, the properties were abandoned. Formerly a smelter was operated; the building now stands at Darwin. That town formerly contained 3,000 inhabitants; now it is reduced to a few, waiting a revival of mining interests. The basis in previous times was copper- silver-lead, with a little gold (silver and lead predominated); these products were obtained in the Darwin district proper, which has a recorded production of $6,000,000. The Lucky Jim is stated to have produced $2,225,000; the Defiance, $1,500,000; the Lane, or Last Chance, $500,000; the Columbia, Custer and Christmas Gift, about $600,000 each. While the principal values were in silver and lead, some gold was found. Hay is worth $20, laid down at Darwin from Keeler; wood, $9, laid down at Darwin from Coso. The elevation of Darwin is 3,600 feet.

The Darwin (or Argus range proper) lies between the Panamint range and the Coso mountains, and is south-southeast of the White Mountain range. The range is about 70 miles in length and very narrow.



ISABELLA—MODOC DISTRICT.

Through its northern portion runs the Darwin cañon.

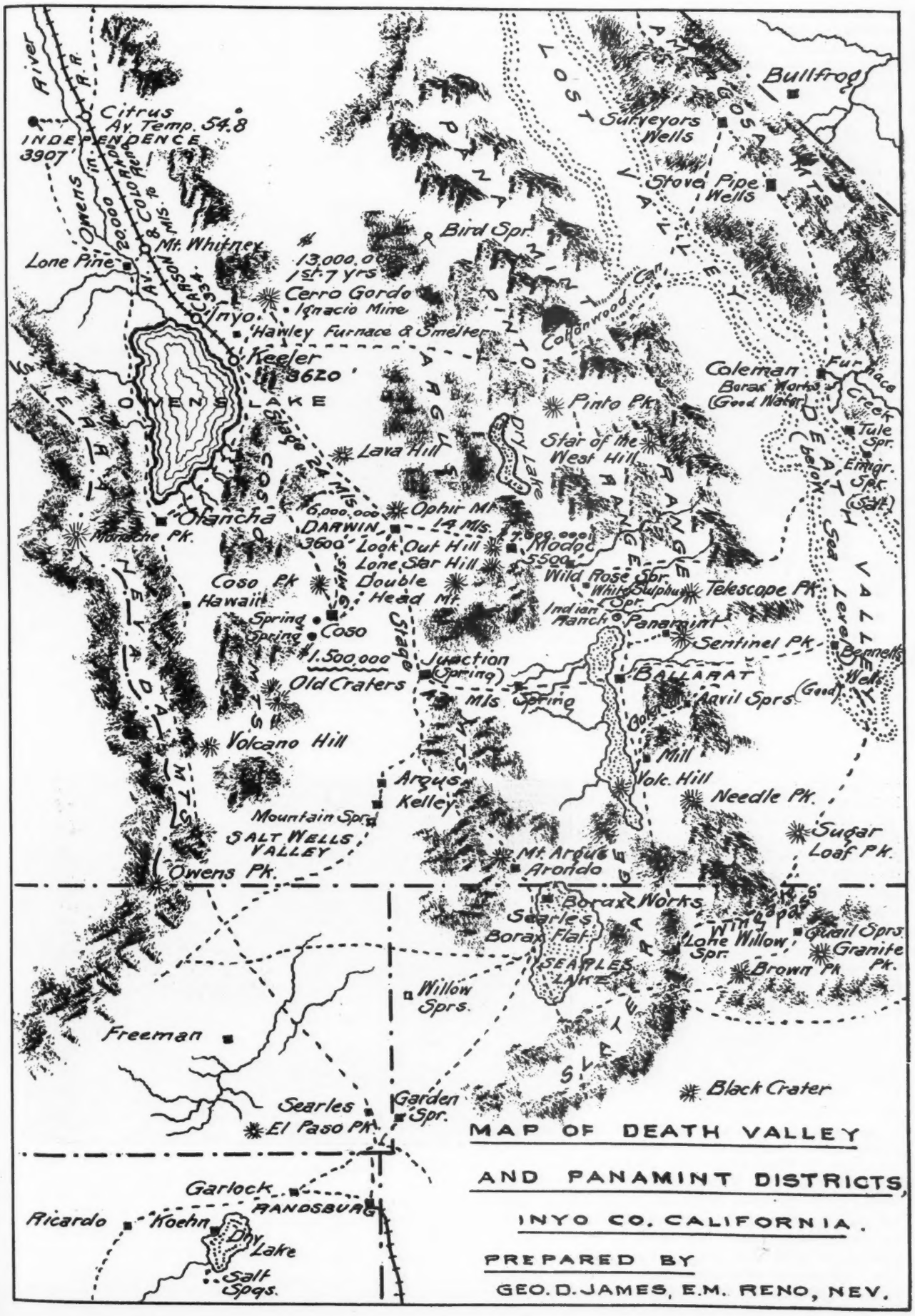
H. W. Fairbanks notes that the eastern face of the Argus range, from Darwin to Modoc, is made up largely of limestone, which sometimes forms the crest of the range and is present in great thickness.

LEAVING DARWIN FOR THE PANAMINT.

There is also calciferous quartzite. This Paleozoic series is provisionally mapped as Cambrian, in view of the probable age of the rocks of the Panamint range to the east.

F. B. Weeks advises that in 1900 he found in Shepherd cañon heavy exposures

*Mining engineer, Reno, Nevada.


Owens River
Citrus
Av. Temp. 54.8
INDEPENDENCE
3907
Lone Pine
Mt. Whitney
Cerro Gordo
Ignacio Mine
Inyo
Hawley Furnace & Smelter
Keeler
3620
OWENS LAKE
Slate Range
Lava Hill
Dry Lake
Star of the West Hill
Panamint Range
Ophir Mt.
14 Mls.
Olancha
Monache Pk.
DARWIN
3600
Look Out Hill
Lone Star Hill
Double Head Mt.
Modoc
5500
Wild Rose Spr.
White Sulphur Spr.
Telescope Pk.
Coso Pk.
Hawaii
Spring
Coso
Indian Ranch
Panamint
Sentinel Pk.
Bennetts Well
Junction (Spring)
Old Craters
Mls Spring
BALLARAT
Avril Sprs (Good)
Volcano Hill
Mill
Volc. Hill
Needle Pk.
Argus
Kelley
Mountain Spr.
SALT WELLS VALLEY
Owens Pk.
Mt. Argus
Arondo
Sugar Loaf Pk.
Borax Works
Searles Borax Flat
SEARLES LAKE
Lone Willow Spr.
Quail Sprs.
Granite Pk.
Brown Pk.
Willow Sprs.
Freeman
Searles
El Paso Pk.
Garden Spr.
Black Crater
Garlock
RANDSBURG
Ricardo
Koehn
Dry Lake
Salt Spgs.
Bullfrog
Surveyors Wells
Stove Pipe Wells
Bird Spr.
Cottonwood Cañon
Coleman
Borax Works
(Good Water)
Furnace Creek
Tule Spr.
Emigr. Spr. (Salt)
Pinto Pk.
DEATH VALLEY
Below Sea Level
MAP OF DEATH VALLEY
AND PANAMINT DISTRICTS,
INYO CO. CALIFORNIA.
PREPARED BY
GEO. D. JAMES, E.M. RENO, NEV.

of quartzite overlaid by limestone, which he had no hesitation in referring (on stratigraphic grounds) to the Cambrian. According to Mr. Fairbanks, granite occupies a considerable portion of the Argus range, forming a continuous body which stretches

IN CANON NEAR WISCONSIN CLAIM, COSO DISTRICT.

from the Mojave desert to the Sierra Nevada. In general, it is a granular light-colored biotite-hornblende rock .

From Darwin cañon north to the 36° 30′ parallel the mountains are described as black lava hills on the topographic map of the Wheeler Survey (65-D). This same portion of the range is also represented as volcanic on the preliminary geologic map of California, issued by the California Mining Bureau in 1891. On this map the lava is represented as extending southward along the range to a point beyond Malurango peak.

H. W. Fairbanks reports numerous flows of andesite and basalt through the Argus range, forming inclined plateaus on the mountain slopes. One of these basalt flows is exposed in Argus gulch, and beneath it is an ancient river channel filled with clay and gravel. A number of gold-bearing quartz veins are scattered through the southern portion of the Argus range. There is also, in the neighborhood of Darwin and Modoc, considerable galena, rich in silver, in chambers in the limestone.

We next left Darwin for Coso. From Darwin the road goes for a considerable distance through deep sands, southward; thence turning west toward the range, and also the Panamint valley.

On my way I learned that the Los Angeles property was bonded for $90,000. The Changed Wonder (operated by Mr. De LaMar) was also noticed, with good values. The Josephine mine produced $400,000 in gold (the average being $18 per ton) from the plates; this mine, situated on the road, was worked 25 years since, but was abandoned for the same reason that applies to the properties usually worked by the Mexicans, namely, that water and sulphides were encountered. The result shows that the best veins await the application of modern methods. The mill installed by the owners is one mile from the property. A porphyry dike runs across the country, clearly defined, and is seen for miles.

Coso was reached at noon, after which examination was made of several properties one mile from town. They are low-grade on the surface, with no developments; but they are adapted to cyanidation, no copper being found. From subsequent assays of surface rock I found from $2 to $9.60 per ton in gold; the ledges and veins, however, show a width of from 50 to 200 ft., mineralized porphyry predominating; in fact, it is difficult to locate the extent of the vein. This camp of Coso is at least 30 years old, but is practically virgin ground.

Water power can be developed by modern methods, for the operation of large plants; springs appear in several places; timber is adjacent, which can be delivered at reasonable prices, considering the nature of the country.

The central portion of the Coso mountains is reported by H. W. Fairbanks to be a coarse, easily decomposed granite, and the same writer states that granite makes up most of the rest of the range. This is continuous with the granite of the Sierra Nevada.

Mr. Gilbert notes that the western base of Coso range, south of Owens lake, appears to be entirely eruptive. Mr. Fairbanks has noted volcanic rocks belonging to two distinct periods of eruption in the western part of the range. To the older rocks belong rhyolites and andesites, while the younger consist of extensive flows of basalt (so recent in origin that their surfaces have been but slightly modified by erosion) reaching southward in long arms into Salt Wells valley.

Returning to Darwin for the night, on Sept. 20, I left for the Modoc district. After team work for 10 miles, through a heavy sandy desert, we arrived at the foot of the Argus mountains. Leaving our buckboard, we rode over the range to the Modoc district, on the other side, which was reached at 3.25 in the afternoon.

An extensive ledge of quartz (at least 5,000 ft.) occurs on the properties; at the Clementina, the claim nearest the summit of the mountain, the open cut showed a width of 4 ft. with quartz throughout; further down the slope was a drift 60 ft. in length. Still further down, on the Isabella (a continuation of the Clementina northward), a vein of 2½ ft. in width was disclosed at a depth of 12 ft.; the general average of this vein is $77.65 in gold per ton. (This property is about one mile northeast from the Golden Argus mine, which has a considerable record.) On the New Year (a continuation of the

AT THE WISCONSIN, COSO DISTRICT.

Isabella), at the bottom of the cañon on the other side, but in the same ledge, I found a tunnel (crosscut) about 30 ft. long, with drifts each way, for 20 ft. in length; the ore in the bottom of the tunnel was about 3 ft. wide, carrying good value, but evidently neglected in the desire to find a continuous vein in the drifts

MONUMENT ON CLAIM NEAR COSO.

mentioned; the course of the ledge is east and west throughout the claims mentioned.

After my examination of these properties, my diary as to exact dates ceased; desert countries formed a part of my investigations; water was of more interest to me than a diary. At least the common necessities should be provided when one makes a trip across this region. Mining engineers have to be prepared for whatever exigencies may occur.

From Darwin to Ballarat, a stage line runs for a distance of 42 miles; this brings us to the east side of the Panamint valley, on the west flank of the Panamint range, about 60 miles southwest of the Bullfrog district. Considerable interest is here being shown; Telescope peak, the highest in the vicinity, can be seen from Rhyolite. From this section the majority of the waters find their source, and the cañons from either side of the range are at times filled with sufficient water for ordinary operations.

Honupi and Willow cañons contain probably the largest flows of water from this source. It is stated that there is a permanent discharge in the Willow cañon of 90 in.; or, on the basis of 9 gal. per min. for each inch from a legal standpoint, 810 gal. per min. (or roughly, 2.25 cu. ft. per sec. from a California standpoint). In the Honupi cañon, there are 60 in., or 1.5 cu. ft. per sec. The waters of Willow cañon have been appropriated for power purposes. Bennett's Wells, which contain the best of all waters in this section of Death valley, take their source from Willow cañon.

In passing, I may state that the Death valley, Panamint valley and other similar districts, are not as hard as has been pictured. Much of the dark side was romance, legend of the past; but the time has come for an elucidation of actual fact.

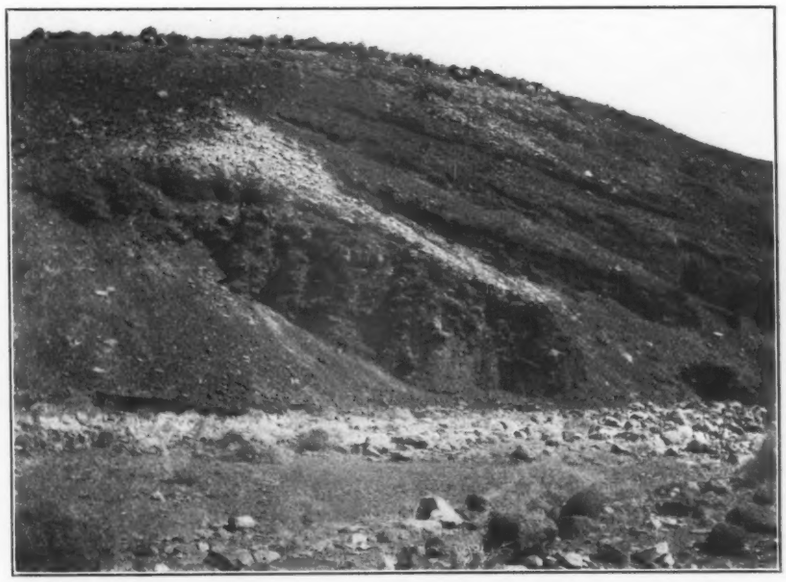
Before my trips to those sections, I had naturally anticipated the heat, barrenness, lack of water, a dry tongue, "the noise of solitude," and other troubles which deter the investor from penetrating the regions of death. I was agreeably surprised to find that (with the exception of meeting few people on the way) most troubles were imaginary. I found water for my mules and party within a reasonable distance; my tongue was not dry at any time. True, one may expect "the noise of solitude," in a country which awaits the hum of the stamp or cyanide mill. One may look for miles across valleys, white with the glare of the eternal sunshine and perfect climate; and across leagues of sand undisturbed for centuries. Yet the Archean formations, in all their primitiveness, have acted as a barrier to all intrusions from subsequent periods. Long stretches, for miles and miles, show this fact, and the azure of prominent peaks in the distance, across the various valleys and ranges, to the contemplative observer, tells the immense possibilities to be found within the region.

Water often disappears in the sand and gravel before the valley is reached, but it is again found in wells and springs on the western edge of the great marsh which has produced borax. This shows that with systematic and scientific development, the waters can be conserved for practical operations.

In Willow cañon, $25 per ton has been found in a 15-ft. vein. Some consider that cyanidation is necessary for the ores of the Panamint district; but at the same time, the ores may be classed as free milling.

From a geological standpoint, the formation may be included under the head of rhyolites, andesites and basalts in similarity to those of Tonopah, Bullfrog and Goldfield; for this reason the miner and prospector are wending their ways to the Panamint, to Funeral, to Modoc and other districts.

In the Wild Rose district, the ledges are 40 ft. wide, and assays of $100 per ton are shown; negotiations with Eastern investors are proceeding. From two ledges intersecting, the assays show from $81 to $193; it is stated that there is 2,000 ft. of this along the vein; wood and water are found in satisfactory quantities.



IRON DIKE, ON THE WAY FROM KEELER TO DARWIN.

In the language of an old prospector, there is a possibility if not a probability, that the stories of wealth of the mines of Death valley, Panamint, Modoc and Furnace creek, are true to the extent that great values may be found, but the country is hard to prospect. The result is that secrets of the exact locations, accord-

ing to all reports, are kept hidden. The desert is alive with gold; the mining fever is in the ascendant, especially as regards new discoveries.

According to the local papers, there are more prospectors today than in the last 30 years; strikes are of a daily occurrence, and there will soon be a rush to these parts. All hay has been purchased, and teams are few on the road between Randsburg and Ballarat. Accommodations are not sufficient for the influx of people. One of the best enterprises is the opportunity for stores, boarding houses, etc. The demand is greater than the supply. Prospectors come to town with ore, the value of which is not divulged; but good properties are awaiting investment. It is the old story. The investor who delays may "get left."

In the Funeral range much prospecting has been done. The hills are full of ledges showing various values. The Johnnie mine is in operation, and the Chespa has recently shipped about 25 tons to Ivanpah. In view of the fact that prospectors, in some instances, have transported water on mule back for 20 miles, there is a proposition under way for sinking for wells in the Lee district.

Much romance has been indulged in with reference to the famous "Peg Leg" mine; it was discovered in 1837, by a prospector with one wooden leg. Losing his way, and nearly dying of thirst, after securing a number of nuggets, he went to Los Angeles. The result was that about 50 men followed his trail in the endeavor to locate the placer; the majority of these either died of thirst, became crazed, or got rid of the small amounts of money which they originally possessed. Years after, another prospector ventured to seek the location of the property; he gained $7,000 in nuggets; but subsequently died from hardships and privations; no one learned the secret of his explorations. According to the narrations of the inhabitants of that region, the last attempt to relocate the property was made in 1896; $10,000 in nuggets was secured, and after they were disposed of at various drinking places, a supply was secured for similar purposes from the property. This sort of thing took place from time to time until this man was summarily disposed of. Since then no one seems to have rediscovered the property. When the prospector (who by the way was a Mexican) was killed, $7,000 was found on his ranch.

The foregoing is simply given as a sample of the reported possibilities of the values of that section; all operations have been of a primitive character. But modern methods will to a great extent reduce the seeming difficulties which at present exist. Underground waters can be conserved; the desert, barren at present, will become fruitful; the hydraulic and the mining engineer will find a way to procure the water that may be necessary for mills. The water from the springs is good; other water can be developed, either from springs or wells. At the same time, when one visits the section for the first time, he is struck with the seeming barrenness, the want of water, of wood, and of all that is necessary for a satisfactory investment. But all these can be overcome.

The discharge of Owens river, taken at Mammoth creek at Saw Mill, on Aug. 4, 1902, was 26.87 sec. ft.; on the same date, at Convict creek, near the crossing of Bishop road, it was 37.14 second feet.

For the year 1904, the maximum flow was 790 sec. ft., or 39,500 in.; the minimum was 2 sec. ft., or 100 in. This was at the Citrus bridge (whence connections were made for the county seat, Independence). The lowest maximum discharge was in January, 30 sec. ft.; the highest, in June, 700 sec. ft. The highest minima were in October and November, each of 360 sec. ft.; and the lowest minima were in April and May, or 2 second feet.

The highest mean-discharge was in June, or 572.5 sec. ft.; and the lowest in May, or 76.8 second feet.

At Round valley, the maximum was 504 sec. ft. in July; it was 184 sec. ft. in January. The minimum was 382 sec. ft. in June; it was 152 sec. ft. in January. The mean was 532 sec. ft. in June, and 156.6 sec. ft. in January.

From other natural streams, at Bishop creek, the maximum was 479 sec. ft.; the minimum, 24 sec. ft.; and the mean, 111 second feet.

At Pine creek, the maximum was 213 sec. ft.; the minimum, 5 sec. ft., and the mean 34 second feet.

There is no reason why the waters of Owens river, either from Citrus, or Keeler, cannot be utilized for electric power to operate the mines of the various districts; this will obviate the present difficulties in the way of water or fuel for the various operations required.

Another Advance in Diamonds.

In our issue of Oct. 7 we announced an advance of 5% in the value of diamonds made in London on Sept. 26 by the syndicate controlling the diamond market. Cable advices from London state that another advance of 5% was made on Nov. 1. This is the third advance of 5% made this year, making an aggregate of 60% advance in the price of uncut diamonds within the past four years. The explanation given by the De Beers Diamond Selling Syndicate for the present increase in value is that they were recently defeated in income tax cases, both in Cape Colony and in England. The London courts held that while the diamonds came from South Africa the real business was in their sale in London. The courts in the colony decided, on the contrary, that the company made its profits by the digging of the stones and the sales in London were only an incidental feature of the business. The company as a result finds itself doubly taxed. The real cause, however, is the advantage the De Beers and Premier companies are taking of the evidences of returning prosperity. Continued advances in the value of both cut and uncut diamonds may be expected at regular intervals for some time to come; notwithstanding the lowering of costs of production and increased yields of the mines.

Analytical Methods for Iron.*

BY W. A. SIEBENTHAL.

The compiling of methods for the analysis of iron ores used in the laboratories of the iron mining companies in the Lake Superior district was suggested by the work of Francis G. Phillips.[1] The plan therein carried out has been followed in the work herein discussed.

A letter was addressed to each of the chemists, whose names and address we were able to obtain, requesting a description of the methods used by him in the determination of iron, phosphorus and such other substances as might be determined. The responses were quite general; most of those addressed sent in a description of the method.

The intention is not to present a complete treatise on iron-ore analysis, but rather to set forth in detail the methods of procedure carried out in the daily work of the analysis of iron ores; these furnish the basis for the grading of the ores and the commercial transactions of the mining companies.

Because of the limited time allowable for analyses, and considering the accuracy and reliability that results must present, I believe that, in the Lake Superior district the methods employed are as rapid and at the same time as reliable as may be found in use in any section for the commercial analysis of iron ores.

I realize that the present compilation is in many respects crude and imperfect. I attempted to reach all the chemists of the region, and wished to give all an opportunity to contribute to the work. Doubtless there are some who have worked up certain methods that they may not care to give out at present.

The reports from the chemists of the different mining sections are distributed as follows: From Minnesota, five, representing the Vermilion and Mesabi ranges; from the Gogebic range, six; from the Menominee range, five; from the Crystal Falls district, two; from Marquette county, three; from the Baraboo district, Wis., two; and from Ontario, one; 24 in all.

Iron.—Two methods are in general use in the determination of iron; one, the permanganate method, is used by 17 chem-

*A paper read at the Lake Superior Mining Institute, Menominee Range, Oct., 1905.

[1] "Methods for the Analysis of Ores, Pig Iron and Steel," published by the Engineers' Society of Western Pennsylvania, 1896, and later in book form by the Chemical Publishing Company.

ists; the other, the bichromate, by only seven.

Phosphorus.—Three general methods are described with various modifications. One, the Handy alkalimetric method (in which the phosphorus is precipitated as yellow ammonium-phospho-molybdate, is dissolved in standard sodium hydrate, and is titrated with standard nitric acid) is used by 20 of the chemists; the Emmerton method (in which the yellow precipitate is dissolved in ammonium hydrate, reduced with zinc and sulphuric acid, and titrated with potassium permanganate) is used by three; and a modification of the Wood method (described in Blair's "Chemical Analysis of Iron," in which the phosphorus is determined gravimetrically by weighing the yellow ammonium-phosphomolybdate precipitate) is used by only one of the chemists. In some instances two methods are reported by some of the chemists. Two methods of more than usual rapidity are described; one by John McNamara, of Ironwood; the other by F. A. Janson, of Vulcan, Mich.; both being modifications of the Handy method.

Silica.—Two methods are described; the sodium-carbonate fusion method is used by seven; the hydrofluoric acid method by four; both are used by some of the chemists.

Manganese.—Volhard's method, with various modifications, is used by 14 of the chemists; Julien's method by one; and a gravimetric process is described by one.

Calcium.—Of those reporting methods, 10 use a gravimetric method (precipitating the calcium as oxalate, igniting, and weighing as calcium oxide). One uses a volumetric process, titrating with potassium permanganate.

Magnesia.—This is determined gravimetrically as the pyrophosphate by six.

Alumina.—This is determined as phosphate by nine of the chemists who report methods for such determinations.

Sulphur.—This is determined as sulphate by those reporting on the determination.

Titanium.—Only one chemist describes a method for this.

Moisture—Methods are described by four; for organic and volatile matter, three chemists note methods.

There is a possibility for improvement and an excellent opportunity for research along the lines of shortening and simplifying some of the methods given, especially in the determination of phosphorus. A method for the direct oxidation and dissolving of the phosphorus without the complete solution of the ore would greatly simplify matters.

The two methods given for the determination of iron are quite simple, when compared with those described for other substances, yet each has certain objections; the permanganate method, because of the inconstancy of strength of the solution; the bichromate method, because it is slower and requires the use of an external indicator. An internal indicator would be a decided improvement in the bichromate method. Keeping the permanganate solution under some neutral gas (rather than in contact with the air) might remedy the objection to the permanganate method.

New Chinese Labor-Law in the Transvaal.

The Legislative Council, in the Transvaal Colony, has just promulgated as law the Labor Importation Amendment Ordinance, 1905. The measure was designed with a view to remedying the results of the idiosyncracies of the Chinese laborers and of many shortcomings that in actual practice were revealed in the original Labor Importation Ordinance. Under the provisions of the new ordinance, the superintendent and every inspector of Chinese laborers shall have jurisdiction to try offences committed by a laborer on the premises where he is employed against the regulations. On conviction such a laborer may be sentenced as at a resident magistrate's court, and where a fine is imposed the employer may withhold such fine from the laborer's wages. A warrant of imprisonment on conviction by such court shall also operate similarly to one issued by a resident magistrate, and the general procedure shall conform to that of a resident magistrate's court. The Supreme Court may be asked to review or repeal any sentences passed. Every mine shall provide a secure lock-up for prisoners awaiting trial, which shall be deemed to be a jail. The laborers shall be divided into separate gangs or sections, each under the control of a Chinese head-boy, whose duty it shall be to report any offense committed by those under his charge. Failure on his part to do so shall be an offense punishable with a fine not exceeding £5. Moreover, in cases where offenses are not reported by the head-boy, a collective fine, not exceeding £1 per head, may be levied on all the laborers in the gang or section; and the employer may deduct the amount of such fine from wages. Penalties are provided for noncompliance with this section by the mining authorities. The superintendent may, with the consent of the importer, or, failing that, with the approval of the Lieutenant-Governor, order the repatriation, at the expense of the importer, of any laborer who he believes hampers the proper control of the laborers on any mine. For legal purposes the secretary or manager of any company importing laborers shall be deemed to be the importer. Any private white person may arrest, without warrant, any Chinese laborer found outside the Witwatersrand district, and it shall be the duty of such white person to deliver the prisoner over to the nearest police station. Payment according to a tariff framed by the Attorney-General may be claimed for the loss of time and expenses incurred in making such arrest. Sanitary rules framed by an importer, with the approval of the superintendent, and posted on the premises in English and Chinese, shall have the same force and effect as the regulations of the original ordinance. Further stringent regulations are laid down with regard to opium. Any laborer who shall obtain, by purchase, barter, or otherwise, or who shall be in possesion of gum opium, extract of opium poppies, or preparation of poppies, shall be liable on conviction to a fine. Any person who shall sell, barter, give, or otherwise supply same to a laborer, except for medicinal purposes, shall also be liable to heavy fines and imprisonment. To facilitate prosecutions under this head, the burden of proving that the supply of such articles was made to a laborer, not knowing him to be such, or was made for medicinal purposes, shall lie with the accused. Laborers guilty of fraud or deception in their work, or who shall wilfully or negligently lose, throw away, or damage mine property, or who shall use threatening or insulting language to anyone placed in authority over them, shall be liable to a fine or imprisonment, or both.

The Minette Iron-Ore District of France.

The iron ores of the Minette district are coming into prominence simultaneously with the entrance of France upon the world's iron market. These Minette ores are of oölitic nature, closely resembling the Clinton iron ores of our Eastern and Southern States, and are developed along the borders of Luxemburg and Lorraine. Two distinct basins are recognizable in French territory, that of Nancy and that of Briey and Longwy, the outputs of which during the last two years, have been, in metric tons:

	1903.	1904.	Increase.
Nancy	1,668,533	1,711,770	43,237
Briey and Longwy	3,233,131	3,821,437	588,306
Quarries	390,679	418,067	27,388
Total Meurthe-and-Moselle	5,292.343	5,951,274	658,931

The Nancy district is not expected to show any important increase in the future, but Longwy, with its outcrop mines, and Briey with its deep mines, are looked to for further rapid growth in output.

Shipments of this ore to other departments of France, to Belgium, Luxemburg and Germany, totaled 1,043,000 tons in 1904; its average value at point of production was $0.68 per ton. Employees in the iron mines numbered 6,075 in 1904; in the Longwy-Briey basin, their wages averaged $1.16 to $1.35 per day. Cutting machinery is popular, electrically driven Morgan Gardner chain machines being used in the mines at two localities.

Pure vanadium will scratch corundum, and is probably the hardest metal.

Churn-Drill Prospecting.

BY GEORGE C. MC FARLANE.*

Maximum economy in drill prospecting can be attained only by choosing a style of drill outfit and a system of boring, adapted to the conditions presented by the region that is to be examined. Where possible, three or four drill rigs should be run together, keeping the machines within half or three-quarters of a mile of each other; in this way, one man can exercise a general supervision over the rigs; one team can move them, and haul the necessary fuel, water and supplies; also one set of special tools for fishing and repair work will do for all the machines.

For prospecting to moderate depths (where the country rock is not especially hard nor the surface débris difficult to penetrate) a gas-pipe churn-drill, cutting a 2- or 2½-inch hole is generally used. Three hundred feet is about the economic limit for this style of drill, unless the rocks are quite soft; in the later case they can be used to depths of 400 to 500 feet.

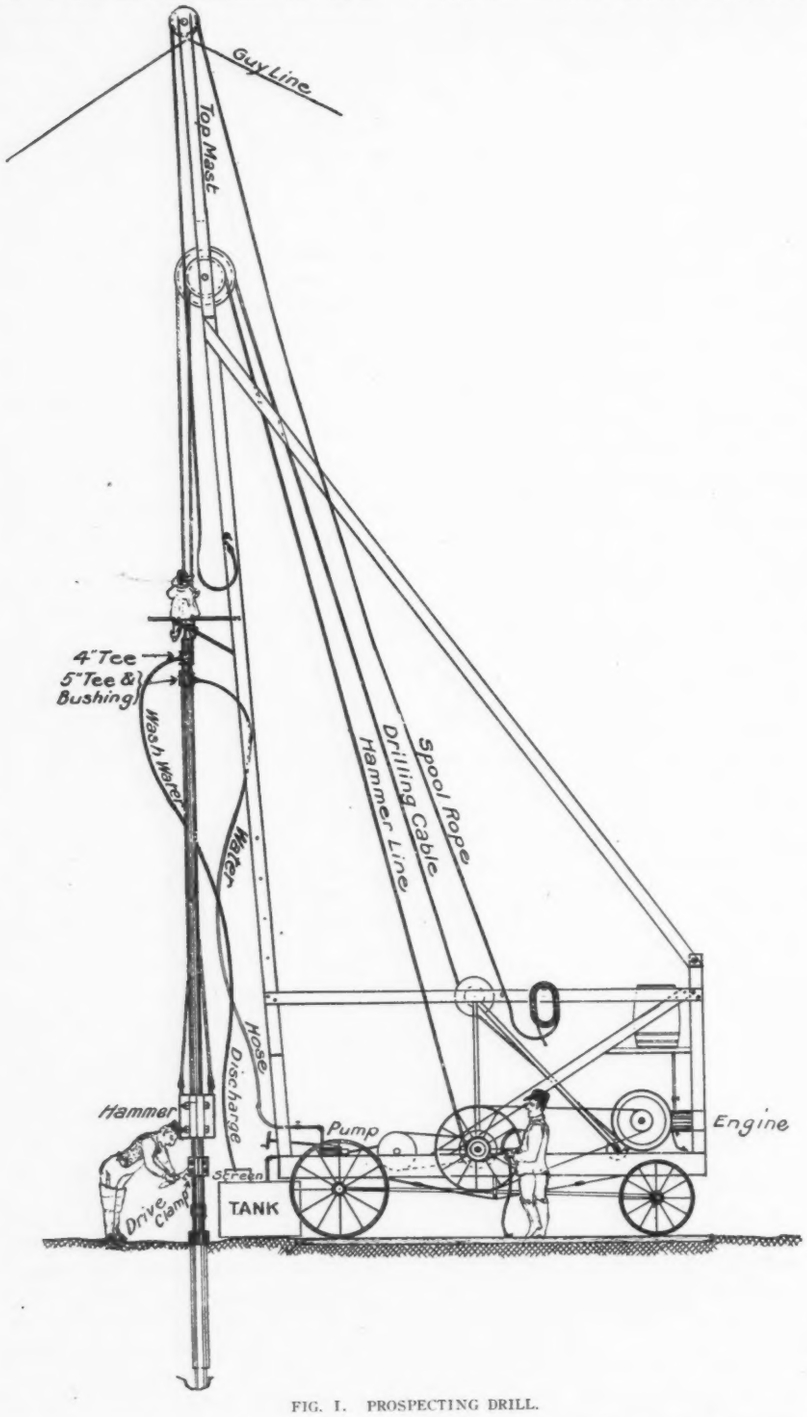


FIG. I. PROSPECTING DRILL.

The outfit required will include: A small portable machine with a 22-ft. derrick; a spudding and hoisting mechanism; and a 5-h.p. gasoline engine. A pair of 3-in. plunger pumps, driven by a belt or sprocket chain, should also be mounted on the frame. It is also advisable to put a 6-in. spool or cathead on the pitman shaft; such a spool is often handy for lowering or pulling rods and casing, and for jumping the drill when the driller is feeling his way through a vein or mineral zone. Gasoline power is preferable to steam, unless wood or coal is cheap and accessible, and water abundant.

Each machine will require the following outfit of tools: 200 ft. of 2-in. pipe (standard weight); 300 ft. of 1-in. extra heavy pipe; 50 ft. of 1-in. extra heavy hydraulic pipe; 100 one-in. extra heavy couplings; 25 two-in. couplings; 6 ⅝-in. steel or brass balls; 1 three-in. mud bit; 6 two-in. rock bits; 30 ft. of 1-in. wire-wound hose; 1 two-in. drive head; 1 one-in. water-swivel and 8 ft. of 1-in. hose; one 300-lb. hammer cast in halves to clamp around 1-in. pipe; 1 pair drive clamps; 1 pipe vise; 2 chain tongs; 2 pipe tongs; 1 pair sliding-tongs; 1 die stock, 1 in. by 2 in. dies; 1 small portable forge and anvil; 120 ft. of 1-in. manila rope; 1 tool-chest with hammers, files, chisels, belt laces, etc.; 4 empty oil barrels, 2 iron tubs, for catching and preserving samples of drill cutting; 1 piece brass screen (30-mesh) 16 in. square; 12 galvanized-iron pails; 100 two-oz. wide-mouth bottles; 20 yards sheeting.

If the drill is to be used in cold weather a shanty (about 10 by 26 ft. and 7 to 8 ft. high) will have to be provided. This can be made of ½-in. pine lumber made up in 4-ft. sections.

The machine will cost about $500; the outfit of tools and housing about $300.

Each group of three or four drill rigs should be provided with a tank wagon; an extra wagon for moving tools, an assortment of fishing tools, an electric battery, dynamite, and exploders, etc., costing $300 additional.

The expense of operation per shift will average per day about as follows:

Driller	$3.00	to	$4.00
Helper	1.50	"	3.00
Gasoline	.70	"	1.20
Water	.50	"	1.00
Repairs and supplies	.50	"	1.20
Depreciation	.50	"	.50
Total	$6.70	"	$10.90

Through the usual run of slate, shale, sandstone and limestone encountered in the coal measures (and where the overburden is free from beds of quicksand and large stones) a 300-ft. hole can be put down in from 6 to 10 days. Beside the time spent in drilling, it requires a day and a half to move and set up the drill and housing, re-thread drill rods, etc.; allowing $15 per hole for general superintendence, the cost of holes will vary from 21c. to 46c. per ft. When conditions are favorable even better results can be shown.

Five years ago I had charge of the drilling of a coal territory a few miles east of Saginaw, Mich., where the average cost for the season was 22c. per ft.; individual

*Mining engineer, Bay City, Mich.

250-ft. holes were put down, in two instances, for 8c. per foot.

For prospecting the more indurated and metamorphosed rocks associated with the ores of zinc, lead, iron and copper, and for prospecting placer ground, heavier rigs (drilling holes with a diameter of 4 to 6 in.) are used. Aside from being larger and heavier, these rigs are similar to the small machines; they are usually built with a 32-ft. derrick, and an 8-h.p. engine.

Machines of this class cost from $650 to $800, and are usually supplied with a set of cable tools. For accurate results, however, it is better to equip with a set of hollow drill-rods and tools, so that the drill-cutting can be automatically pumped to the surface. The outfit, required for boring 1,000 ft. in this manner, and where the over-burden is not over 150 ft. deep, would be as follows: 10 ft. of 7-in. gas pipe; 150 ft. of 5-in. gas pipe; 1,000 ft. of 1-in. double-strength pipe; 1,100 ft. of ¼-in. double-strength pipe; 150 ft. of 1½-in. double-strength pipe; 300 one-in. hydraulic couplings; 100 ¼-in. hydraulic couplings; 22 ft. of triple-heavy 3-in. pipe for drill stem; 1 six-in. mud bit; 6 four-in. cylindrical bits; 1,200 ft. of 1⅛-in. water laid cable; 1 socket for pulling drill; one 800-lb. hammer (cast in halves). There will also be required the same outfit of hand tools and accessories as enumerated for the small testing rings. The cost of this list of tools will be about $700. The cost of operation per 10-hour shift will be as follows:

Driller	$3.00	to	$4.00
Helper	1.50	"	3.00
Gasoline	1.10	"	1.75
Water	.50	"	1.50
Repairs and renewals	1.50	"	3.00
Depreciation	.90	"	.90
Total	$8.50	"	$14.15

The rate of boring will depend on the depth and character of the rock covering, the hardness of the country rock, and the number of mineral veins passed through. Where the over-burden is not over 100 ft. deep (and the country rock is comparatively free from bands of hard jasper, flint and ironstone), a 1,000-ft. hole can ordinarily be put down in 60 shifts. This rate of boring gives the driller ample time to accurately record and sample the different mineral-bearing zones passed through, and to keep the machine and drilling tools in good repair. It frequently happens that so many hard streaks are encountered as to require 80 or 90 shifts to put down a 1,000-ft. hole. This is due to the fact that in these hard streaks it is difficult to keep the hole in gauge, and it takes time and patience to ream the hole through them. The cost per foot of hole will vary from 50c. to $1.30.

In localities where the mineral zone is overlaid by several hundred feet of barren strata, it would be advisable to bore through these strata with solid tools, as better time can be made in this way than with the more refined hydraulic system. It is important that the cutting bits be proportioned to the rock to be cut. Soft slate and shale require a sharp knife-edge bit, while limestone and sandstone require a blunt cutting edge and wide heavy shoulders on the bit. In boring through mineral deposits, the experienced drill operator can tell much of the physical character of the material, by the feel of the tools as they strike bottom. All these indications should be noted, and implicit reliance should not be placed on the samples of drill cutting washed up, especially where

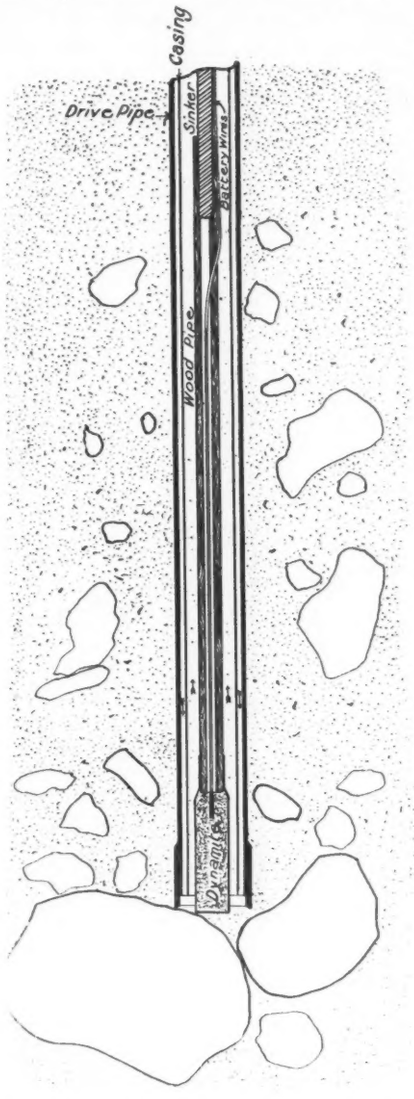


FIG. 2. DRIVE-PIPE AND DYNAMITE CHARGE.

the deposit consists of alternate hard and soft streaks, as the wash water chambers the hole in the soft material and thus an excessive proportion of the soft material shows in the sample.

If the drill rigs are provided with housings, boring operations can be conducted as economically in winter as in summer.

Fig. 1 illustrates a method of prospecting placer ground and of driving bores through glacial drift and alluvial deposits, as far as 250 ft. deep. Ordinarily, "drive pipe" is driven in short lengths for 15 or 16 ft., when the short lengths are unscrewed and a long length substituted.

In boring by the method illustrated, an ordinary portable cable rig is used; a short top-mast is spliced to the top of the derrick, being used in swinging the drill and stem out of the hole when a long length of casing is up. The hole is started by driving a short length of 6-in. pipe through the surface soil. Drilling is commenced with a 6-in. mud-bit and heavy gas-pipe drill-rods, forcing wash water down the rod with the pumps.

When caving material or quicksand is encountered, 5-in. gas-pipe casing is put in the hole; an inner casing of 4-in. light well-pipe is placed inside the drive casing, the two casings being separated at the top by a bushing and packing ring. Water is forced down between the two casings, and the sand rising through the inner casing is conveyed (by a tee and hose) to the screen-box and tank; the wash water being used over and over again. Regular long lengths of casing are used; the drive hammer (which is cast in halves and fits around the casing) strikes on a clamp ring, which can be raised as the casing is driven down. The hole is spudded with a 4-in. bit and 20-ft. sinker-bar attached to the drilling cable. The advantage of this method of driving pipe is apparent when a big hard-head or a nest of boulders is struck; then the circulating wash water will keep the sand from settling around the stone until the sinker and bit are removed and a charge of dynamite lowered.

Fig. 2 shows the proper way to prepare a charge of dynamite. The explosive is packed in a bottle-necked tin canister, holding about 4 lb. The canister is lashed with marlin to a wood pipe 6 ft. long; the upper end of the pipe fits on to a sinker of 1¼-in. round iron, the blasting cable passing up inside the wooden pipe. A ½-in. manila rope is used in lowering the blast to the bottom of the hole.

The wood pipe protects the insulation of the battery wire and takes the force of the explosion, which would otherwise be expended on the iron sinker, causing it to kink and bend and possibly jam in the hole. When the dynamite is lowered the casing is pulled back 6 ft. by hammering up on the drive ring and prying up with a long lever and chain. The charge is then exploded with a small magneto-electric battery. It usually requires about 3 hours to blast a boulder in quicksand and drive the casing back to place. It is the exception to run on to more than three boulders big enough to require blasting in any one hole. In ordinary placer ground (where it is anywhere from 50 to 80 ft. to bedrock) one or two big stones will be encountered. It always pays to blast stones rather than attempt to drive alongside of one that doesn't quite clear the shoe of the drive-pipe. The outfit required for placer prospecting by the above method is as follows: 1 cable-rig drilling machine, with a 15-ft. extra mast; 500 ft. ⅜-in. galvanized wire rope for guy lines;

35 ft. of 1-in. hose; 35 ft. of 1½-in. hose; 200 ft. of 1½-in. water-laid cable; 500 ft. of 1¼-in. manila rope; 200 ft. of 1½-in. manila rope; two 4 by 4 by 1½-in. tees; two 5 by 5 by 1-in. tees; one 5 by 4½. bushing; 1 packing ring; 200 ft. 5-in. double-strength pipe; 120 ft. of 4-in. artesian casing-pipe; 25 5-in. couplings; one 800-lb. hammer (cast in halves); 1 wrought-iron drive-ring; 1 3-in. by 20-ft. sinker-bar; 1 4-in. bit; 1 rope socket; 2 chain tongs; pipe wrenches; 1 portable forge and anvil; tool-chest; packing; waste oil; small tool-chest; packing; waste oil; small tools, etc.; the outfit will cost from $1,200 to $1,300.

The cost of operation will be: 1 driller, $4; 2 helpers, $6; gasoline, $1.75; water, $1.50; repairs and renewals, $3; depreciation, $0.85; total, $17.10.

A drill crew should move and set up a machine, bore an 80-ft. hole and pull casing in a day and a half, if the machine does not have to be moved over a quarter of a mile. Where the bedrock lies from 40 to 60 ft. down, and the holes are put close together, a drill crew can put down a hole a day. If the ground is mostly clay, sand and fine gravel, two and even three holes can be put down in a day. The cost will vary from 20c. to 60c. per foot.

Temper Carbon and Graphite in Iron.*

BY F. WUEST AND C. GEIGER.

In this paper the influence of hydrogen, carbon dioxide, steam, silicic acid, and iron oxide are discussed separately and at considerable length, with detailed tables of experimental results. The conclusions obtained are as follows:

1. "Temper carbon" does not disappear on quenching the iron. Therefore, in consideration of the present views regarding iron carbide, Fe_3C, temper carbon cannot be regarded as an ingredient of this carbide.

2. Contrary to the opinion maintained hitherto, "temper carbon" cannot be vaporized either by pure dry hydrogen or by nitrogen. The tempering process can be effected only by substances which furnish oxygen.

3. Graphite can be vaporized, not only by carbon dioxide and steam, but also by iron oxide. Therefore in these respects graphite conducts itself precisely like "temper carbon."

*Abstracted from the concluding paper in *Stahl und Eisen*, 1905: No. 20, Oct. 15, 1905, p. 1196.

According to a recent article in the *Revue Scientifique*, Paris, in Korea the true Carboniferous coals are of less importance than those of Tertiary age. The latter occur over large areas in the north of the peninsula. Unfortunately, the high percentage of ash (31) quoted by the author seems to preclude any hope of remunerative working on a large scale.

The Geology of Tonopah.*

BY J. E. SPURR.

Ore deposits were discovered in the Tonopah district, Nevada, in April, 1900, by James L. Butler. The town of Tonopah soon had a population of several thousand. The climate is arid and the water supply scanty.

The rocks of the mining district are all of immediate volcanic origin, with the exception of a series of water-laid tuffs, which represent the accumulation of fine volcanic detritus in a Tertiary lake. All of the rocks are of Tertiary age, probably Miocene-Pliocene.

The first eruptions of this volcanic epoch, as displayed at Tonopah, were andesite. Two andesites have been distinguished—the earlier andesite and the later andesite, which is slightly more basic than the earlier andesite. Subsequently, rhyolite and dacite eruptions occurred at intervals for a long time and produced several of the formations studied, which include tuffs and flows. The rhyolite and dacites are closely connected in every way. In one of the latest periods of eruption, these lavas produced the volcanoes whose necks, left in relief by the erosion of the surrounding softer materials, now form the hills around Tonopah.

The water-laid fine tuffs were deposited in this rhyolite-dacite volcanic epoch at the time when the eruptions had ceased temporarily. The lake basin may have been formed by a sinking of the crust consequent upon the long-continued volcanic outpourings. The epoch of the deposition of the lake beds was closed by an uplift, accompanied by regional tilting. A little basalt was then thrown out from volcanic vents, the cones of agglomeratic dacite material were formed, whose once liquid necks are now represented by the isolated hills.

The area occupied by the dacitic volcanic necks is co-extensive with the region of observed complicated faulting. Study leads to the conclusion that this faulting was chiefly by the intrusion of these necks. After the intrusion and subsequent eruption there was a collapse, a sinking of the various vents. The still liquid lava in sinking dragged down with it adjacent blocks of the intruded rock.

The silica contents of the lavas show a fairly regular transition between the different types, but there is a marked break in general compostion between the andesite-basalts on the one hand and the rhyolite-dacites on the other. In some of the most silicious rhyolites there appear to be numerous pseudomorphs after hornblende, which consist of fresh rhyolitic groundmass and indicate that the hornblende had been dissolved and replaced by the magma. In the dacite phases of the rhyolite-dacite fresh hornblende is occasionally found. In the andesites, especially the earlier phases, hornblende is abundant. In the basalt there is abundant hornblende, but it is often pseudomorphosed by magmatic action into aggregates marked by crystals of iron oxide. It is concluded that in both the highly silicious (rhyolitic) and in the least silicious (basaltic) magmas, hornblende was developed as a first crystalization, which was unsuited to later conditions. A change of magmatic composition since the first crystalization is inferred, and the original magma is thought to have been intermediate or andesitic. This theory of magmatic segregation is tested by comparison of analyses, and bears the test well. The theory is reached that an original magma of composition, similar to that of the earlier andesite, has split up the differentiation, first into more basic andesite (later andesite) and silicious dacite, and later, by a continuation of the process, into silicious rhyolite and basalt.

The structure is so complicated that no cross sections have been made. Some interesting information on faulting has, however, been obtained, chiefly from mine workings. The faults are reversed or normal, straight or curved, perpendicular or flat. Many varieties of movement are illustrated by them.

The most important mineral veins occur in the early andesite, and do not extend into the overlying rocks. These veins have been formed, chiefly by replacement, along narrow-sheeted zones, and have all the characteristics of true veins. Transverse fractures have determined the position of cross walls and ore shoots by limiting and concentrating the circulation. The mineralization was probably caused by hot ascending waters immediately after the earlier andesite eruption. The primary ores have a gangue of quartz, adularia and some sericite and carbonates, and contain silver sulphides — such as argentite, polybasite and stephanite — silver selenide, gold in a yet undetermined form, chalcopyrite, pyrite and some galena and blende. The depth of oxidation is irregular. In the ore of the oxidized zone no important changes in the amount of gold and silver, as compared with the primary ore, has been proved to take place. The ore near the surface is not a truly oxidized ore, however, but is an intimate mixture of original sulphides (and selenides), together with secondary sulphides, chlorides and oxides. Secondary sulphides include argentite and pyargyrite.

The Tonopah ore deposits, when compared with others, find their close resemblance in the Comstock in Nevada and in the Pachuca and other districts in Mexico, while the Silver City and DeLamar districts in Idaho are also similar in many respects. These deposits all occur in Tertiary lavas, chiefly andesitic. The writer has previously described the Great Basin region as forming part of a great petrographic province, and later it has been shown that this province extends into

*Outline of Professional Paper, No. 42, United States Geological Survey.

Mexico, and may reach much farther northeast and southwest. The similarity of the ore deposits in the districts mentioned indicates that there is a metallographic province, which coincides in part, at least, with the petrographic province.

A series of veins, of small importance commercially within the Tonopah district, was formed after the eruption of one of the members of the rhyolite-dacite series—the Tonopah rhyolite-dacite. These veins may be large, but are usually low grade or barren. They frequently contain a greater portion of gold than the earlier andesite veins, and have other distinguishing characteristics. In some cases the water accomplishing this later mineralization, probably attacked and concentrated the ores in the earlier andesite veins.

A series of veins of still less importance was formed after the eruption of one of the later members of the rhyolite-dacite series—a silicious rhyolite, which makes up some of the hills near Tonopah. One of these, Mount Ararat, a denuded volcanic neck, is traversed by fissure veins, carrying very little value. These veins are restricted to the neck, and the openings they fill were evidently formed by an upward movement of the plug after consolidation.

Part of the earlier andesite is profoundly altered, chiefly to quartz, sericite and adularia. Other portions are altered chiefly to calcite and chlorite. These alterations phases are transitional into one another, and were evidently caused by the same waters. The maximum effect of these waters was the formation of the mineral veins along their circulation channels. Near the veins they effected the quartz-sericite-adularia alteration, and penetrating further away they effected the calcite-chlorite alteration. The discussion of these processes is followed by the detailed study of analyses of typical specimens. The conclusion is drawn that the mineralizing waters were charged with an excess of silica, and probably of potash, together with silver, gold, antimony, arsenic, copper, lead, zinc and selenium; that they also contained carbonic acid and sulphur, with some chlorine and fluorine; but that they were noticeably deficient in iron.

The alteration by thermal waters of the later andesite was also studied. By comparison of analyses and by microscopic studies it is concluded that the waters which produced the alteration were highly charged with carbonic acid and sulphureted hydrogen, and contained magnesia, iron and lime. The advent of the water is believed to have followed the eruption of the white silicious rhyolite above referred to.

The composition of the mineral waters in the two cases above referred to does not seem to correspond with that of the volcanic rocks whose eruption their advent followed. The eruption of andesite was followed by the advent of silicious and potassic waters, poor in iron; the eruption of the rhyolite by waters rich in lime, magnesia and iron. This antithesis may have some bearing on the origin of these waters. There are two theories of the origin of hot springs—atmospheric and magmatic. In the dry Nevada region there are cold springs which give evidence of magmatic origin, while most of the hot springs show no connection with atmospheric precipitations. The meaning of the nature of the metals in the Tonopah veins was also investigated. The conclusion is reached that the waters which produced the veins were largely given off from the congealing lava below.

The temperature in the Tonopah mines shows an abnormally rapid increase in depth, comparable to that in Comstock.

The water encountered by underground workings is very irregularly distributed. Some of the shafts have reached a depth of over 1,000 ft. without encountering any general body of ground water, yet along certain steeply inclined fracture zones water is found sometimes quite near the surface. These water zones are widely spaced and occur only in brittle rocks. They are probably reservoirs bottomed by impervious clay seams. The porous rocks such as the volcanic breccias, absorb the precipitation like a sponge, and no water has yet been encountered in them.

The relief of the range of hills in which Tonopah lies is primarily due to the volcanic accumulations. These Tertiary volcanic rocks have been eroded and much material has been transported from the hills into the adjoining desert valley. In arid climates erosion is more general than in moist climates, and as a result the relief is determined to a much greater degree by the relative hardness of the rocks. This feature is beautifully illustrated at Tonopah. The complicated faulting has had very slight effect upon the topography.

Direct Conversion of Copper Sulphide.

Interest is directed to the attempt of the Mitchell mine in Mexico to feed raw black-sulphide ore into the converter. It is expected that the metallic copper will be produced directly without the usual preliminary making of matte. High authority is quoted for probable success of this attempt. As the heat of conversion is due to the oxidation of the iron and sulphur of the matte, the smelter will produce (instead of a 65% matte entirely, as at present) some matte of only 40%; and it is with this that some of the high-grade ore will be mixed. But the experiment can consider only the comparatively scanty high-grade ore, and then only in connection with a suitable matte. Hence it will be an incident other than common practice of large tonnage.

If air at 52° is heated to 72°, its capacity for moisture is doubled and is four times the capacity at 32°.

Concrete Mixture.

In proportioning a mixture for concrete or mortar, the engineer of experience uses those proportions for different work which he has found most effective. For important work, however, where local materials are used, it is always well to determine the proportions by actual test. This is not troublesome, nor is it as expensive as might be supposed. The instruments required for the test are an old oil barrel and a dormant scale. The barrel is shoveled full of sand and "struck" to give a flush top surface. It is then weighed; and, after weighing, sufficient water is turned into it to bring the level of the sand and water to the top of the barrel. It is then weighed again; the difference in weight giving the amount of water required to fill the voids in the sand. A similar procedure, with crushed stone (or gravel) and water, gives the weight in lb. of the water required to fill the voids in the aggregate. As the cement and the cement and sand matrix have not the same sp. gr. as water, for each case it is necessary to reduce the weight of the water to units of volume; the result giving both the volume of the cement alone, and also that of the matrix required to fill the voids completely. The sand and the aggregate, when placed in the barrel, should be, as nearly as possible, in the same condition of density as they are to be when mixed.

The Isle of Thasos.

Baron Marschall, German Ambassador at Constantinople, recently visited the Isle of Thasos. He ascertained that the island is rich in mineral springs, as well as in copper ore and borax. The mines belong actually to the personal treasury of the Sultan of Turkey, but they will be conceded to German industrialists, who expect to actively push the exploitation. It may be mentioned that the island was presented by the Turkish Kalif in 1841 to Mahomet Ali, Khedive of Egypt.

In the *Zeitschrift für angewandte Chemie* (1905, No. 38, p. 1512), F. Winteler contributes some notes on the history of the sulphuric-acid contact-process. The author quotes somewhat at length from several early sources, among others from Peregrine Phillips, English patent 6,006, of 1831. The paper of Phillips contains the first mention of the union of sulphur dioxide and oxygen under the influence of platinum; but, as the author points out, the process described shows many of the characteristic features of the modern contact process; indeed, in some points, it is distinctly in advance of later publications. Thus the use of pyrite-burner gas; of an excess of oxygen; of a number of converters arranged in series, with intermediate absorption of the SO_3 formed; and of absorption towers for the SO_3—all these suggestions are mentioned by the original inventor of this process in his patent of 1831.

Asbestos in Canada.

One of the series of bulletins on the economic minerals of Canada, issued by the Mines Branch of the Department of Interior, Eugene Haanel, superintendent of mines, treats of the deposits of chrysotile asbestos in Quebec. The bulletin is the work of Fritz Cirkel, and covers the subject from every point of view, including general information on the properties and geological occurrence of the mineral, its distribution in Canada, the methods and machinery used in its mining, dressing and milling, together with costs of production, descriptions of the mines and dressing works at all the operating mines, the uses of the mineral in the arts, notes on its occurrence in foreign countries, closing with abstracts from the Quebec mining laws governing the location of asbestos properties.

Mining for asbestos in Thetford and Coleraine townships of Quebec began in 1878, but never acquired importance until the installation of mechanical means for dressing the mine product within the last few years enabled the producers both to mine a lower grade of rock and to save a larger proportion of the valuable portions. Sixteen mills are now operating in the district, having a united daily capacity of 3,500 tons of crude rock.

Except in one locality, near Elzevir, in Hastings county, where actinolite is mined and dressed, the whole Canadian output is of the chrysotile variety. It occurs to some extent in the Laurentian serpentinous limestone around Templeton, to the north of Ottawa, but the productive centers are confined to the serpentine areas in the eastern townships of Quebec, two distinct fields—Thetford-Black Lake and Danville-Oxford-Patton—being recognized, with another in East Broughton.

The serpentine rock, carrying veins and stringers of chrysotile, is mined universally in open quarries. Attempts to use underground methods, in the hope of escaping delays during winter weather, have been unsuccessful, owing to the erratic nature of the veins, the interference by wide, barren zones and the large proportion of rock necessary to be moved. One mine in exceptionally favorable circumstances has accomplished this feat. The greatest difficulty to contend with in quarry work is the disposal of waste; early operations have in many cases covered valuable ground with waste dumps.

Surface soil, varying in depth from 2 or 3 ft. at Black Lake to 15 or 20 ft. at Thetford, is removed by pick and shovel and loaded into dumping cars on movable tracks. One Thetford company has installed a steam shovel for this work. For drilling on the benches, steam or air machine drills are common, Ingersoll and Rand, 3⅛ by 6¾-inch size, being the most popular. Block holing is done by hand and by little giant drills. The common explosive is 40% dynamite, and electric firing is usual. The average execution is 4¼ to 5 tons of rock per pound of explosive. A few quarries have passed 150 ft. in depth. Rock is hoisted by boom derricks or by suspension cable derricks; the boxes in which it is handled hold between 16 and 20 cubic feet of rock, weighing 2,200 to 2,500 lb. Dumping cars for transport to mill, at the large mines, hold 3 to 6 tons, and are handled by locomotives.

The amount of hand dressing devoted to the product in the quarry varies with circumstances. Some mines send the entire output to the mill; others make a rough separation into:

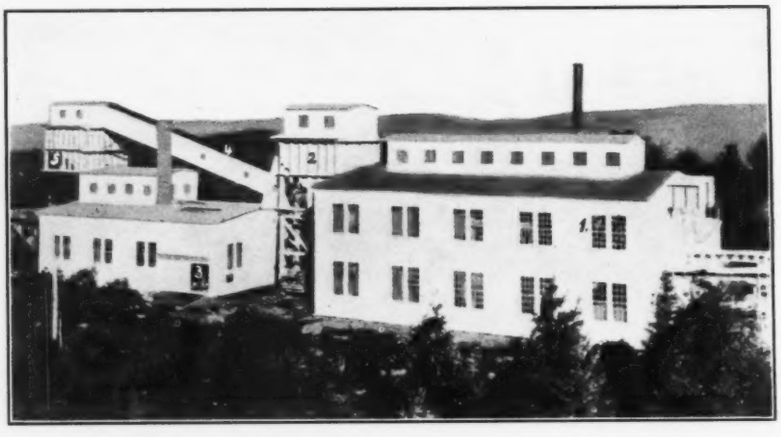
(*a*) "Crude," the long asbestos fiber and the rock containing it.

(*b*) "Milling material," the rock containing shorter fiber.

(*c*) "Fine material," resulting from fracture of the rock.

(*d*) "Waste."

The crude is reserved for hand cobbing; the second and third classes are sent to mill, and the waste is discarded.



AMERICAN ASBESTOS COMPANY'S PLANT, BLACK LAKE, QUEBEC.

The crude is separated in cobbing sheds generally into two grades, No. 1 measuring over ¾ in. and No. 2 exceeding 5-16. This hand work is commonly done by contract at 30 to 35c. per 100 lb.; the cost ranges from $6 to $8 per short ton.

The only pieces of apparatus peculiar to asbestos mills are beaters or "fiberizers," suction elevators and collectors; all other drying, crushing, grinding, and screening machines are of the well-known standard types. One kind of fiberizer consists of a horizontal stationary cylinder 30 in. diameter and 12 ft. long, through the axis of which passes a shaft carrying groups of four perpendicular arms, the groups separated by 6 in. The shaft is revolved 500 to 700 r. p. m.; asbestos-bearing material is fed into both ends at the top, and is discharged at the middle of the bottom, the beating blades being set to propel the material toward the center. The cyclone fiberizer consists of a pair of chilled steel propellers facing each other near the bottom of a cast-iron chamber, and revolving at 2,000 to 2,500 r. p. m. in opposite directions. A propeller wears about two weeks. The feed is about walnut size and the discharge about pea size; the capacity on rock of average hardness is about 40 tons per hour.

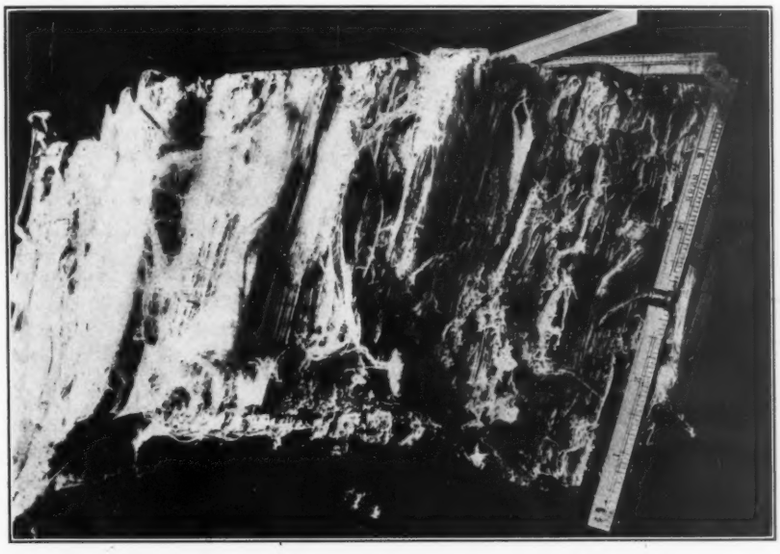
The suction elevator, the motive power of which is a fan of 30 to 40 in. diameter going at 2,000 r. p. m. terminates in a cone flattened so as to span the lower end of a shaking screen, presenting a rectangular opening 6 in. wide into which the loose fibers are drawn. The collector is a closed conical hopper into which the fiber-laden blast from the suction fans enters tangentially near the top; dust escapes through an opening in the center of the cover while the fiber falls out at the bottom.

The method of milling differs in every mill. In general the rock first passes through a jaw crusher and then through a rotary dryer, whence it is elevated to a rotary crusher at the top of the mill. After this, it is further reduced in the cylindrical fiberizer and then passed over a shaking screen with sixteenth-inch holes, the loosened fiber being lifted by suction from the lower end to be collected as first grade. All the remaining material passes successively through cyclone beaters, grading screens and grinders until the maximum amount of fiber is recovered. Tailing is pulverized for use in plaster. For details, we must refer to the original article.

Besides the two grades of "crude" obtained by hand cobbing, usually three grades of product are obtained in the mill, designated as "long spinning fiber," "spinning fiber," and "paper stock." One mill recovers these in proportions of 15.6, 32.2 and 53.2, respectively. As to the total yield from quarried rock, the general proportion is 2% of crude, and between the limits 30% and 60% of milling rock; the latter yields between 6 and 10% of fiber in the mills. The cost of labor at one mill, capacity 250 tons of rock per day, is $0.25 per ton of mill rock, or $2.56 per ton of finished fiber. For the whole operation, on the basis of an average output of 7.5 tons of asbestos fiber per day, the costs at one mine for three consecutive months were $8.86 for mining and $8.55 for milling, total $17.41

per ton of finished product. Of this total, labor took $10.13; power, $4.19; bags, $1.40; machinery repairs and supplies, $1.01; explosives and other supplies, $0.68.

Current prices obtained per ton for the various grades are as follows: No. 1 crude, $175 to $200; No. 2 crude, $110 to $125; fiber No. 1, $75 to $80; fiber No. 2, $50; paper stock, $20 to $25.



CANADIAN CHRYSOTILE ASBESTOS.

The output of asbestos in 1904 was 35,479 tons ($1,186,795) and of asbestic (ground tailing) 13,149 tons ($13,124). Exports go, in order of size, to United States, Great Britain, France and Germany.

There are now 14 incorporated companies, of which 10 are operating at this time. Four companies are in the Thetford district: the Johnson, the Bell, the King Bros. and the Beaver asbestos companies. Seven are at Black Lake: the Standard, the Manhattan, the Glasgow and Montreal, the Union, the Johnson, the Syracuse and the American; only two are now working at East Broughton: the Quebec and the East Broughton; while all the mines at Danville are now owned by the Asbestos & Asbestic Company, Limited.

The principal difficulty in the way of spinning asbestos is its lack of cohesiveness in a strand, owing to the absence of the roughness in the fiber that characterizes animal and vegetable tissue. Spinners have succeeded, however, in producing an asbestos thread of fair strength weighing one ounce per 100 yards. One of the most satisfactory uses of asbestos is as piston-rod packing in compound engines using superheated steam. Woven into cloth, or twisted into ropes, asbestos is useful for its fire-resisting property. As a heat-insulating material it is applied to boilers and pipes either as a plastic, or in molded casings. Its most widespread use is in fireproofing and building materials, of which numerous patented forms under a variety of names are now on the market.

Coal Mining Methods.

The characteristics peculiar to coal seams, by which their method of attack is caused to differ from those employed on metalliferous deposits, are:

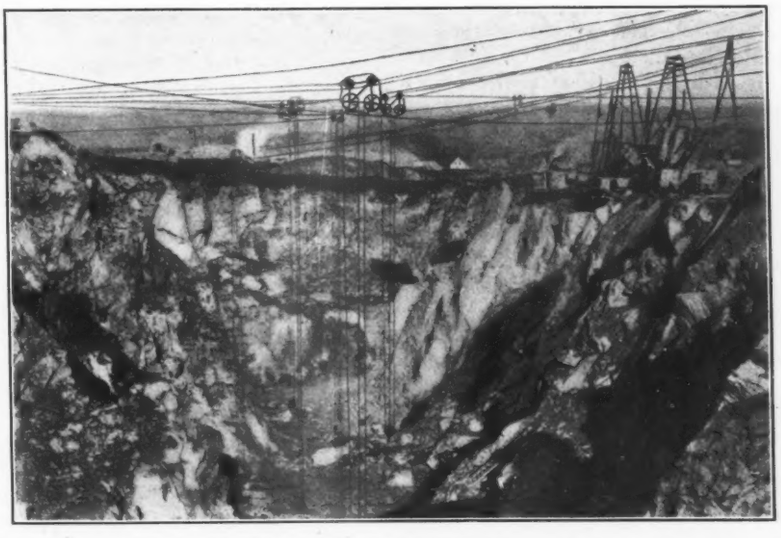
1. A general regularity in thickness and uniformity in composition over wide areas, features which obviate the necessity of such extensive preliminary testing as most metalliferous deposits should receive, at the same time permitting a methodical layout of openings and working places. It does, however, require marketable material to be left as pillars to support the overburden, a duty which, in most metal mines, is abundantly fulfilled by areas of rock having little or no value.

2. A nearer approach to the horizontal, as observed in all bituminous, and in the Lackawanna anthracite fields. This circumstance permits a wide application of mechanical haulage, with an accompanying increase in output.

3. The invariable association of coal seams with stratified rocks, those in immediate contact with the coal being of the softest kinds, clays, shales and an occasional limestone. Their plasticity, which alone made long-wall work a possibility, while it favors the robbing of pillars, and the ordinary breaking down of a coal place, often exerts itself in an irresistible heaving of the floor, necessitating constant grading, with interruption of traffic. Economy of explosives, to which this softness of the underlying stratum and the plasticity of the overlying contributes, is a condition unknown in metal mines.

4. The presence of combustible gas, which, when diluted with sufficient air, becomes an explosive of high order. The provision of adequate ventilation not only involves an elaborate, legally prescribed layout of double or triple entries, air shafts and other special airways, but in the course of mining it requires breakthroughs to be cut, stoppings and doors to be erected and brattices to be constructed, all of which not only have no utility other than to promote ventilation, but are even obstacles to rapid mining of the coal. Ventilating fans and other means of artificial circulation are unknown at going metal mines, as are also the bothersome safety lamps. In these, flameless explosives are not prescribed, nor are metal-mine owners vexed with the question of shot-firers.

5. Low unit value of the product. With prepared anthracite selling at New York harbor points for $4.50, and bituminous for $2.50, per ton, and with the largest and best-equipped producers paying out over 90% of the coal's selling price for mining and shipping it, financial success obviously can result only from operation on a large scale, with its attendant economy in fixed charges. From this neces-



QUARRY OF THE KING BROTHERS ASBESTOS MINE, THETFORD—LOOKING NORTHWEST.

sity was born the invention of 3-ton mine cars, hauled in trips of 60, over 50-lb. rails, by compressed air or electric locomotives, or by endless rope, to be dumped and made up again into empty trips on self-dumping gravity tipples. The saving effected by power-driven punchers and undercutting machines needs only to be mentioned.

The varied systems found in coal mines may be classified under two heads: Room-and-pillar, and long-wall, although combinations of the two are sometimes met. The former system is nearly universal in this country, long-wall working being almost unknown outside of some of the central States.

The room-and-pillar system has many modifications, but in its simplest form it is prosecuted about as follows: Main entries are driven, to the dip in case of an outcrop mine, or to the rise in the case of a shaft tapping the center of a basin, and from these, butt-entries, with their accompanying parallel airways, are extended normally to right and left, following the contours of the seam for the sake of a level grade. From these, rooms are turned at regular intervals determined by the thickness of pillar necessary to hold the roof, to the rise only, if the seam pitches; in a level seam rooms may be turned from the airways also. In order to reinforce the outer ends of the pillars between rooms, these openings are kept narrow for 15 or 20 ft. and then are widened to the safe limit on one or both sides, being driven at this width to within safe distance of the next butt-entry. When all the rooms between two entries are completed, it is best to rob the pillars at once so as not to leave a wide area "on stilts," adding to the difficulty in ventilation and deteriorating the quality of the pillar coal.

Rooms are not always turned perpendicularly from the butt-entries; the prevailing factors determining the direction for driving rooms are: pitch of the seam and the cleat of the coal.

A grade of 5°, or 8¾%, is the steepest on which the regular cars can be handled; a room pitching between 5° and 10° must be worked as a "buggy breast," using a small car operated by tackle and dumping into the regular car standing in the entry. Slopes between 10° and 23° are the most troublesome; in a thick seam, a grade sufficiently reduced to allow of buggy working may be obtained by hanging the room track on stulls, elevating its lower end; all these expedients not only involve extra hand labor, but reduce the proportion of large coal. At 23°, coal will slide freely in iron-lined chutes and at 30° it will run on a rock floor. If, therefore, it is desired to run mine cars into rooms on a moderately pitching seam, an easier grade is obtained by turning the rooms obliquely to the rise; with the disadvantage, however, of weakening the pillars, which are strongest when their long dimensions lie parallel to the dip.

Most bituminous coals show a tendency to fracture along two series of vertical planes roughly perpendicular to each other. The more prominent, or "face cleat," if taken advantage of by a suitable alignment of the working face, will allow a freer breaking down of the coal. This adjustment is so modified by consideration of roof pressure, hardness of the coal, and presence of the "end cleats" as to require individual judgment in each case.

Long-wall methods, wherever they are applicable, are growing in favor, and in the deep, thin seams of Europe, have long replaced the wasteful room-and-pillar system. Two varieties of long-wall mining will be noted, but in general the system aims to extract the whole marketable content of a coal seam, allowing the overburden to settle regularly upon the "gob," rock filling piled up to the rear of of the advancing working face, a sufficient span of roof, reinforced by timber, being retained to allow free room for work. The face is thus continuous for a long distance along the circumference of a circle, whose radii converge at the point of outlet. In very deep seams, especially in basins fractured by faults, or subject to inflows of water or gas, a large area should be divided into panels, and each worked independently.

The natural conditions favoring long-wall mining are:

1. A seam furnishing sufficient waste rock to build pack walls; such a one will be either (1) a thin seam, from above and below which rock must be removed in course of mining, (2) a multiple seam, or (3) a thick seam with partings of poor coal or slate.

2. A hard, solid coal under a heavy roof, in which circumstance the production of fine coal is minimized and consumption of powder is economized.

3. A strong, flexible roof, permitting a wide span over the working face, with only a normal amount of timber, but also a free settling upon the pack walls. Under a cover of 600 or 700 ft., even the strongest roof will settle readily.

Conversely, the circumstances in which long-wall mining is inadvisable, if not altogether prohibited, are:

1. A clear seam over 6 ft. thick, which would necessitate the building of high pack walls with material which might have to be brought from the surface.

2. A roof so strong as to require shootings to bring it down, or so weak as to limit the width of working space and pack roads.

3. A dip of 30° or over, in which case the necessity of keeping the roads level, gives the pack walls a tendency to topple. This may be resisted by a liberal use of timber cogs.

4. A coal or a waste rock liable to self-ignition upon exposure to air and water. This liability is reduced by confining work to a panel of small dimensions.

5. A seam fractured by numerous faults, such as would prevent regular settling of the roof over a considerable area.

6. Overlying water or valuable land which should not be disturbed. The danger of such disturbance is practically negligible with deep seams.

As compared with room-and-pillar work, long-wall, wherever it is not inapplicable, presents many advantages:

1. It yields a larger proportion of lump coal in that no pillar coal is left to deteriorate under pressure, a less amount of explosive is needed, and the necessary narrow work is minimized. This advantage, of course, disappears in the case of a coal designed for coking.

2. Practically the whole seam is extracted.

3. Methods of mining the coal are made easier and cheaper by the freer scope allowed to undercutting machinery, by the diminished use of explosives, the duty of which is assumed by the roof pressure, by the abolition of shearing and working in tight corners, and by the fuller extent to which advantage may be taken of the cleat, all of which features are reflected in an augmented output per man.

4. The working force is concentrated, by which their supervision becomes an easy matter.

5. Ventilation loses much of its complexity and becomes relatively simple.

6. The danger, both to the miner and to the mine, attendant upon drawing pillars, is entirely eliminated.

It must not be overlooked that a condition essential to successful long-wall work is a regularly maintained advance. Any suspension may be followed by a crushing of the coal or a breaking of the roof. Such "loss of face" requires another start to be made, and a consequent waste of coal. It is possible that the well-known irregularity of the American coal-worker has influenced the choice of the pillar system instead of its economical alternative.

Two varieties of long-wall working are practiced: In long-wall "advancing," work begins around the outlet point, a generous pillar being left to protect it, and progresses outward, the return roads being kept open by double pack walls. The roads branch with sufficient frequency to obviate an inconveniently long haul along the working face, and are maintained at their right height by "brushing down" the roof over them.

In long-wall "retreating," haulage and airways are first driven to the boundaries of the property or of the area proposed to work, their ends then connected, and mining recedes toward the point of outlet.

The advancing method has the pecuniary advantage in that production begins at once and grows steadily, without the necessity of any narrow work in the coal. The retreating plan has never become popular, probably on account of involving

a heavier preliminary outlay. It has, however, several features to recommend it:

1. The geology of the seam is ascertained before mining begins.
2. No difficulty is experienced in keeping open the haulage roads and airways.
3. Ventilation is more perfect.
4. Danger of fire in the gob is eliminated.

In general, the retreating method is advisable in thicker seams of hard coal, having a weak roof, and in pitching seams. A mine employing both methods would be sure of a uniform output.

Nitric Acid of High Concentration.

BY ALFRED J. LOTKA.*

Under this title there appeared in this JOURNAL (Sept. 2, 1905, p. 386) a note taken from the *Chemiker Zeitung* (1905, XXIX, p. 698), in which was embodied a table of percentages of actual HNO_3 in concentrated nitric acid, as determined by F. Winteler, together with the corresponding figures from earlier determinations by Lunge. The discrepancies between these two, Winteler ascribes to the superior quality of nitric acid of modern production; this has rendered more careful observations necessary and has cast some doubt on the accuracy of all older determinations.

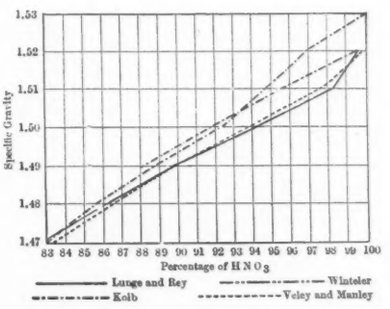
In answer to this, Lunge, in the *Chemiker Zeitung* (1905, XXIX, No. 71) draws attention to the fact that the nitric used in his work,[1] was carefully prepared by distillation at a low temperature and in vacuo; and that both he and Veley and Manley[2] (who made a similar set of determinations) published full descriptions of the methods employed by them, while Winteler furnishes no data whatever on these points, and does not even state whether his specific gravities are referred to water at 15° or at 4°, or whether his values are corrected to vacuum, etc.

Winteler states that "by charging customers for acid of sp. gr. 1.500 as containing 91.8% NHO_3, he was able to avoid the constant friction which ordinarily arises from discrepancies between estimations by the volumetric method and by the specific-gravity test." This is hardly surprising; but, if others should insist on paying for such acid at this rate and on the basis of Winteler's table, a great deal of friction would arise. In consideration of the commercial importance of this matter, it is necessary to settle which of these tables is to be regarded as correct.

This will not involve any redeterminations; several careful experimenters have already duplicated Lunge's work, and their results agree very clearly with his figures, as will be seen from the table given herewith.

The first column of this table contains Kolb's early figures (1866). In the case of these data, as well as with those of Winteler, the temperature of the water used for comparison is not stated. In the second column are Lunge and Rey's figures, referred to 15°/4° vacuum. The third column shows Veley and Manley's results, referred to the same standard. The fourth column was calculated by reducing to 15°/4° the figures given quite recently by Ferguson in his table,[3] and making the requisite interpolations. Finally, in the last column, Winteler's values are given.

Sp. g.	Per Cent HNO_3. Kolb. 15°	Lunge and Rey. 15°/4°	Veley and Manley. 15°/4°	Ferguson 15°/4°	Winteler. 15°
1.480.....	85.75	86.05	86.3	88 20	——
1.490.....	88.82	89.60	89.6	89.81	88.2
1.500.....	92.25	94.09	94.0	94 37	91.8
1.510.....	94.65	98.10	97.8	——	95.6
1.520.....	97.00	99.67	99.8	——	99.7



A comparison of these figures (especially when we bear in mind the incomplete character of Kolb's and Winteler's data) leaves little doubt as to the relative value of the several sets of results. Those of Lunge, and of Veley and Ferguson, agree practically within the limits of experimental error; while those of Kolb and Winteler differ widely among themselves and also from the other three.

Further light is thrown on the question by an examination of the curves representing the relation between the sp. gr. and the percentage of HNO_3: According to Lunge and Veley, two very similar curves are obtained, showing a very distinct break at about 98%. Veley has shown that this point corresponds to a eutectic solution. There is no sign of this feature in either Kolb's or Winterler's curves, which, moreover, in their general character do not resemble either one another, or the other curves.

Finally it should be mentioned, that if the value of concentrated nitric acid is estimated by the sp. gr. method, without allowance for the nitrous acid, serious errors will be made.[4]

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[1] *Zeit. f. angew. Chem.*, 1891, 165.

[2] *Jour. Soc. Chem. Ind.*, 1903, 1227.

[3] *Jour. Soc. Chem. Ind.*, 1905, p. 788.

[4] Lunge and Marchlewski, *Zeit. angew. Chem.*, 1892, XVIII, 10.

The Double Cyanides of Copper.

BY LEONARD M. GREEN.

The determination of the relative amounts of cupric- and cuprous-potassium cyanides (present in cyanide solutions containing copper), although a matter of much importance, has not been given the consideration it deserves.

As is well known, copper in a cyanide solution occurs partly as cupric-potassium cyanide (K_2CuCy_4), and partly as cuprous-potassium cyanide ($KCuCy_2$), the relative proportions of the two compounds being variable. Whereas, the cupric compound is a strong solvent for gold and silver, the cuprous is practically inert, as potassium-cupric cyanide, in the process of dissolving gold or silver is itself transformed into potassium cuprous cyanide.

$$K_2CuCy_4 + Ag = KAgCy_2 + KCuCy_2$$

Potassium-cuprous cyanide has, practically, no solvent action; but it is capable of regeneration by the precipitation of the contained copper (either by means of zinc or electrically). It is therefore quite possible to obtain a working cyanide solution which apparently (according to the silver-nitrate total-cyanide test) contains no available cyanide, and which yet actually possesses considerable solvent power, owing to the presence of potassium cupric cyanide. Such a solution (with the cuprous salt) has, at the same time, a large potential solvent power; this may be developed by the precipitation of the copper in the potassium-cuprous cyanide. After a solution has been for some time in contact with an ore containing soluble copper, the amount of cuprous-potassium cyanide is, as might be expected, at a maximum; but, on passing this solution through the zinc boxes, although the amount of cuprous-potassium cyanide is decreased and copper is deposited, yet the amount of cupric-potassium cyanide is usually increased. This somewhat astonishing result is probably due to the redissolving of some of the metallic copper which had been deposited.

About nine months ago I published a method of estimating the "total cyanide," combined with the copper, in addition to the "total cyanide" as shown by the silver-nitrate test. This test, however, did not indicate the relative proportions of cupric- and cuprous-potassium cyanides which the solution contained. However, by using this test in combination with another, the results for cupric- and cuprous-potassium cyanides may be separately estimated.

When a solution (containing cupric- and cuprous-potassium cyanides, in addition to alkaline and zinc cyanides) is titrated with mercuric chloride solution, the alkaline and double zinc-cyanides are first attacked, mercuric cyanide being formed together with alkaline and zinc chlorides. Then the cupric-potassium cyanide is decomposed, and finally the cuprous-potassium cyanide.

When the cupric-potassium cyanide has all been decomposed, the next drop of

mercuric chloride solution, attacking the potassium-cuprous cyanide, would therefore form mercuric cyanide and cuprous chloride. If potassium sulphocyanate be present, the cuprous copper (which has been turned out of its combination with cyanide) combines with sulphocyanate, forming cuprous sulphocyanate, which gives a yellow tint to the solution.

If a large amount of ferrocyanide be present (so that it is in excess of what is necessary to combine with the zinc present in solution), the end point will occur too late in the titration, thus giving too high a result. This is, however, rarely the case in working zinc solutions; in such cases the difficulty can be remedied by adding a small amount of a neutral zinc salt to the solution to be tested. Should the solution not contain sulphocyanate, a small crystal of potassium sulphocyanate must be added.

The tests for determining the cupric- and cuprous-potassium cyanides are as follows:

1. Take 10 c.c. of solution. Add a little soda and a few drops of a strong solution of potassium iodide; titrate with silver-nitrate solution (13.05 gm. per liter), till a permanent yellowish cloudiness is produced. The result in c.c. equals "a."

2. Take 10 c.c. of solution. Add a small crystal of potassium sulphocyanate (if no sulphocyanates are present). Titrate with mercuric-chloride solution (10.423 gm. per liter) till a permanent yellowish coloration is produced. The result in c.c. equals "b."

3. Take 10 c.c. of solution. Add 3 c.c. of mercuric-iodide indicator (8 gm. potassium iodide, 24 gm. potassium ferrocyanide, 20 gm. potassium bicarbonate; dissolve in water and add mercuric-chloride solution till a permanent red coloration is just produced; make up to 1 liter). Titrate with mercuric chloride solution till a decided permanent reddish coloration is produced. The result in c.c. equals "c."

Then the "total cyanide" (by silver nitrate) $= \frac{a}{10}$ %; the potassium-cupric cyanide (estimated as KCy) $= \frac{b-2a}{20}$ %; the potassium-cuprous cyanide (estimated as KCy) $= \frac{c-b}{20}$ %.

Tests 2 and 3 may sometimes be performed on the same 10 c.c. of solution by adding the mercuric-iodide indicator after the end-point in test 2, and continuing the titration to the red end-point. Sometimes, however, this causes a slight difficulty in determining the latter end-point, owing to the formation of a pinkish cupric-ferrocyanide. If silver is present, a lemon-yellow color is produced before the red end-point appears in test 3.

Steel that has been hardened is too brittle to use without tempering, done by careful reheating until the proper color is obtained.

Broken Hill Zinc.

BY OUR SPECIAL CORRESPONDENT.

From present indications, the production of spelter on an extensive scale will, at no distant date, be firmly established in Australia. At Broken Hill, the tailing and slime have been stacked for many years past, pending the solution of the problem of the extraction of the zinc content. In the last official report, the warden estimates that, at the end of 1904, the old ore dumps totaled 5,687,400 tons; with an average value of 6.3 oz. silver, 6.87% lead, and 18.48% zinc. An ultimate recovery of 60% would represent an output of 630,000 tons of spelter.

For years past attention has been devoted to the production of a profitable zinc concentrate. Numerous systems have been tried, but those which have given the best results so far are the magnetic and acid processes. The magnetic processes have been in operation for some time and have been practically perfected. The acid processes have been in use for only a short period; yet so successful are the results, that the output of concentrate is already equal to that by the magnetic processes. The two acid-processes are known as the Potter, and the Delprat (salt cake); at present, action is pending for infringements of patent.

The Potter process has been described by the inspector of mines, Broken Hill, in the following terms ("Annual Report," Department of Mines, N. S. W., 1903, p. 69): "The Potter process depends on the action of sulphuric acid in hot solution for the extraction of the zinc. The middling is fed into the machine in a dry stream; as soon as it passes into the sulphuric-acid solution (which is warmed to a fixed temperature by steam) the zinc particles float to the surface, buoyed up by small bubbles of gas which form on each one. When these particles reach the surface the bubbles burst, and they sink again; but the construction of the machine compels them to drop into a V-shaped launder, whence they are conveyed away (by traveling scrapers) as concentrate."

The Delprat process is thus decribed by the warden ("Annual Report," Department of Mines, N. S. W., 1904, p. 41): "The plant now in operation treats weekly 3,500 tons of zinc-bearing mill-residue, and consists of six treatment pans or vessels; into these the ore is mechanically fed, together with a weak solution of salt cake which attacks the carbonates in the material and produces small bubbles of gas; these cling to particles of zinc sulphide and buoy them to the surface of the liquor, whence they flow over the sides of the vessel and are deposited in a settling vat of 50-ton capacity; from these the liquor overflows and is pumped back for re-use. The waste material in the treatment pans sinks to the bottom of the vessels, and is drawn off in a continuous stream. The tailing, after being deprived of solution, is carried on conveyor belts to the mine and trucked underground for filling."

An essential for success is the fineness of the material, so that the zinc particles may not be too heavy when acted upon by the acid solution. The concentrate produced by these processes averages from 39% to 42.5% zinc. The advantages of these two processes lie in the facts, that the plant required is inexpensive, and the up-keep nominal; the sulphuric acid is obtained as a by-product in connection with the process (Carmichael-Bradford) adopted for the desulphurization of slime and concentrate. However, another process, the DeBavay, is announced from which even better results are expected. Under this process the tailing is treated by a system of water concentration by flotation. A concentrate with 45 to 50% zinc can be obtained; it is also claimed that a substantial proportion of all the metallic contents of the material submitted can be saved in subsequent operations.

The Broken Hill Proprietary Co. has commenced the erection of a plant at Port Pirie for the production of spelter, and the chairman of the directors has announced that long before the expiration (in 1907) of the present contract (for the disposal of 40,000 tons of zinc concentrate per annum), the company should be producing spelter.

The Sulphide Corporation is working a zinc-distillation plant on a small scale, the output for 1904 amounting to 299 tons. It is, however, the recent extensive purchase of tailing to which the greatest significance is attached. The Broken Hill Block-10 Co. has disposed of 100,000 tons of zinc tailing, and has given an option over an additional parcel of 500,000 tons. The average of the parcel sold was about 21% zinc. The Broken Hill South Co. has disposed of its dump of 700,000 tons (averaging 19% zinc), and has contracted for the sale of the tailing to be produced by the concentrating plant for the next nine years.

The Broken Hill Block-14 Co. has sold 200,000 tons, averaging about 16.5% zinc. These purchases (which total some 1,500,000 tons) have all been made in the same interests, but the names of the buyers have not been made public. It is only reasonable to surmise, however, that the recent visits of H. C. Hoover (of Bewick, Moreing & Co.), Lionel Robinson and H. J. Daly, are not wholly unconnected with the transactions. In any case it is evident that a powerful combination of capitalists is moving in the direction of establishing in Australia an industry which must be a factor in the world's supply of spelter, and which will enhance the value of the Broken Hill mines.

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THE CHIEF SOURCE of the asbestos supply of the world is now found in Canada, and the mines of Quebec were never more actively worked. An excellent monograph on this remarkable mineral was recently published by the Mines Bureau of the Dominion. An abstract of this monograph will be found on another page.

IN THE MONTH of October for the first time the production of pig iron in the United States passed two-million tons, the estimated total having been 2,083,000 tons. This shows very nearly the extent of present capacity, as nearly all the furnaces available—after deducting those out for necessary repairs—are now in blast.

CONFLICTING ACCOUNTS concerning Chinese labor continue to come from the Transvaal. The Chinaman is giving a good deal of trouble, and matters are not working as smoothly as could be wished. It is evident that some of the trouble, at least, comes from ignorance of the peculiarities and prejudices of the Chinaman, and from the apparent belief that he can be controlled only by brute force; a mistake which time may correct.

LAKE IRON ORE shipments in October ran up to 4,257,000 tons, making a total for the season up to November of 29,730,615 tons, and indicating a probable total of over 33,000,000 tons for the year. What work such a movement requires is shown by the fact that an average of 150,150 tons has been passed over the shipping docks daily since navigation opened. In July, the month of heaviest shipments, the average was 168,534 tons daily.

THE REPORT ON Tonopah, from the active pen of Mr. Spurr, comes none too soon to a camp that is almost five years old. Of course, observations on mining geology, to be reliable, to a certain extent must wait for the mines to cross-section the veins; but we venture a gentle and courteous word of stimulus to our Geological Survey that they use all due haste in giving us at least a preliminary sketch of the numerous other camps to be found in the vicinity of Tonopah.

THE OCCURRENCE of fluorine in blast-furnace slags, as noted by the paper of Professor Austin, is a unique item in the history of smelting; indeed, it is a metallurgical curiosity. We hope that other reports bearing on this topic may appear. Meanwhile we would note the desirability for a quick and accurate method for determining fluorine in small quantities. It would indeed be an anomaly if fluorine should occur in slag in large quantities, in view of its extraordinary affinity for silicon, and the volatility of silicic fluoride.

Canadian Coal Duties.

The Canadian coal producers, especially those in the east, are agitating the imposition of a duty on anthracite coal imported from the United States into the Dominion. While Canada charges a duty on bituminous coal, anthracite has hitherto been left on the free list, in view of its extensive use for domestic purposes in eastern Canada. The coal operators of Nova Scotia, however, claim that at the present time the importation of anthracite includes large quantities of dust, or culm, and of the small steam sizes which are used in manufacturing and under boilers to a very considerable extent. This use of anthracite, they claim, puts it fairly in competition with Canadian bituminous, and they believe that they should be protected against this competition, as they are now on soft coal. The use of small anthracite is very considerable in Montreal and other large cities of eastern Canada, where Nova Scotia coal could be delivered at a reasonable price. The duty asked for is 60 cents per ton, and it is thought probable that this will be imposed, at least on culm and the small sizes of coal, even if it is not put upon the domestic sizes of anthracite.

Electrothermic Smelting.

A new application of electricity to metallurgy has been found in the generation of heat, which has already developed a series of processes happily designated as "electrothermic" in contradistinction to the "electrometallurgical." The latter involve decomposition by electrolysis; the former act by heat alone and are analogous to the ordinary pyrometallurgical processes; but the heat is developed from mechanical power, instead of by the direct combustion of coal, or similar fuel. This is in fact what has been done for several years in the production of calcium carbide, carborundum, silicon and similar products. The electrothermic metallurgical processes are direct evolutions of the carbide processes.

The electrothermic smelting of iron and steel, and of zinc is already practically carried on. Experiments with copper ores

have been made. Up to date, however, the most progress has been made in the production of iron and steel, which is now being done at several works in Europe, while one plant has been started in the United States.

It is obvious that any reaction which requires only an elevation of temperature, can be effected by heat from an electric source as well as from direct combustion of fuel. The chief considerations are a proper adaptation of the electric furnace to meet the special conditions of the process, and the relative cost of the heat. The efficiency of the electric furnace is already comparatively high, say 50%, although it will doubtless experience great improvement in that direction. However, under present conditions it would be much more expensive to develop heat of any temperature within the range of the coal-fired furnace by electricity than by coal, if the electricity has to be generated from steam power, even with a plant of the highest efficiency. The first applications of electrothermic smelting will be therefore at places where water-power is cheap and coal is dear.

Aside from the question of cost, however, the introduction of electrothermic methods opens a wide vista of new developments through the possibility of attaining very high temperatures. The manufacture of the carbides has been due entirely to that ability. What application it may have in the production of the common metals no one can now foresee, the knowledge of their behavior at temperatures above 1,500° C., which is about the limit of the ordinary furnace, being extremely limited. It is, however, more and more realized how reactions which take place within certain limits of temperature may be reversed at a higher range. The electric furnace increases enormously the range which has previously been practicable.

Science and Practice.

Science is simply organized knowledge. The technologist is apt to scoff at the work of the professor of pure science; but the science of today will be the practice of tomorrow. It is vain to forecast that any branch of science, however theoretical it may appear, will fail to be of practical use in the future. During the last twenty years we have seen a new science develop —physical chemistry—which is abstruse in its character and was at first little understood. The labors of its masters, like Arrhenius, Ostwald, Nernst and van't Hoff, have led to discoveries throwing a new and powerful light on natural laws, and in the words of Prof. Christy: "It is not too much to say that the hope of the future, not only in biology, medicine and hygiene, but also in physical geology, the science of ore deposits, and the art of metallurgy, lies in this direction."

What does the future hold in store in the domain of practical metallurgy? He would be bold who would venture to answer that question. In looking back over the achievements of the last twenty years, and considering the apparent degree of perfection to which many of our industrial processes have been developed, both in respect to percentage of extraction and cost of treatment, there seems to be little room for further improvement, and some are prone to the belief that progress will go on at a diminishing rate; but a century ago the same idea was expressed, and since then we have seen what we have seen. This inclines us rather to the idea that future progress will advance in a geometrical ratio, and even now we obtain glimpses of what may be, as in lightning flashes, through some new invention, holding out marvelous possibilities, like Gayley's for the drying of the air blast in iron smelting.

Karsten, who died just two years before the first Bessemer experiments, in 1831 remarked that "however greatly the state of metallurgy in a further three hundred years might surpass that of the present, an outlook to which the rapid progress being made in the discovery of natural laws gave encouragement, it was not likely that the disparity between then and now would be as great as that between now and three hundred years ago." We do not now think so much in that way, in spite of the marvelous progress since Karsten's time. Robert Sticht concluded his presidential address at the last meeting of the Australasian Institute of Mining Engineers with these striking words: "The progress already made teaches us to look forward to scientific revelations in the future, the applications of which will make the methods of today appear like those of the veritable dark ages, and will relegate the sixteenth and the nineteenth and the twentieth centuries into one common obscurity of mere semi-science."

Nevada Mines.

This State, in her mining history, illustrates the difficulties encountered by one who has greatness thrust upon him and who is expected to live up to a great reputation. The stories of the marvels of the Comstock and of Eureka are almost stale in mining literature; and perhaps for this very reason, as the State comes again to the front, in anticipation at least, she is confronted by exaggerated and unreasonable expectations. In addition to this it is the fashion for the speculative world to look for a new bonanza every decade. West Australia, Cripple Creek, the Rand, Alaska and the Yukon have each in turn served to whet the appetite for novelty in large mine production. Under such circumstances, amid much cheap advertising, and with some cool-headed estimation, Nevada has been opening her old camps, and finding new ores. Tonopah, Goldfield, Bullfrog, Kawich, Silver Peak, the White Mountains—together with the neighboring Panamint just over the California line—comprise a group which is commonly lumped in popular conception as "the New Nevada." But the ore conditions in these respective localities, while showing a general likeness, still have their individual characteristics and possibilities.

It is worthy of note that few of the recognized authorities have as yet dared openly to predict a great future for any of these camps. To be sure there has been no wholesale condemnation of this New Nevada; and meanwhile prospecting is going on with much systematic energy and with some definite result. In addition to this, we note that several noted capitalists have invested largely in the more prominent properties; and published report is to the effect, that throughout all these neighboring camps there is a decided tendency toward centralization of ownership and operation by large capital. This may in part explain the persistent reticence of the experts, and the equally persistent reports of the accumulation of high-grade ore on the dumps in consequence of the inadequate facilities for outward shipment, the entire resources of the existing railroad being taxed to carry needful supplies into the camps. Also the smelters have themselves limited the amount of ore which may be shipped out, on account of its highly silicious nature.

Broadly speaking, it may be said that, while we have not yet sufficient data to

form a basis of judgment as to the permanent value of the goldfields of southern Nevada, the results already achieved, the large amount of ore in the dumps and blocked out in many of the best-developed mines, and the steady prospecting operations now being carried out over a wide area and in the face of unusual hardships and difficulties, indicate that we have by no means heard the last of this interesting country. We do not look for a ready-made bonanza camp; it takes time and capital to develop such a phenomenon. We do, however, anticipate a growing strength in ore returns which will make its own reputation in its own way.

Chimney Construction.

Most engineers give too little attention to the requirements of a proper mortar for laying up brick chimneys. Some, indeed, in an endeavor to secure strong construction, will use a mortar high in cement, and without *any* lime. This is extremely rigid, and worse, on that account, than the weaker, cheaper mortar in which lime is substituted for cement. A mixture of the two, in the proportion of one part cement to three parts lime, will give a superior matrix. This mixture should be considered as forming one part of the mortar, and the sand should be added in the proportion determined for the particular case in hand.

A mortar made as above possesses the desirable features of maximum strength, due to the cement content; maximum elasticity, due to the lime; and minimum cost, because the amount of cement used is comparatively small. A mortar that is made with equal proportions of cement and lime is no stronger, is less elastic, and costs more. A cement-and-lime mortar will not be made stronger by the addition of cement beyond a certain point; this point is reached when the cement comprises approximately 25% of the cement-lime mixture.

A brick chimney laid up in cement-lime mortar of the proportions 1 : 3 : 12, and 100 ft. high, swayed 2⅞ in. at the top in a good stiff breeze; this is an evidence of good construction. A chimney that is laid up in mortar rich in cement is rigid, and apt to develop cracks due to bending strains; while the more elastic the mortar is (within certain limits) the less liability there will be to cracks from this cause, and consequent leakage. The unequal heating in some chimneys will also develop cracks due to temperature strains, and here, too, an elastic mortar is a valuable factor, inasmuch as it may materially aid in the prevention of such happenings as the following:

A tall brick chimney was laid up in mortar of equal proportions of cement and sand, and, when put to use the first time was fed on one side of the baffle wall in the center, only one set of boilers being used at the time. The resulting temperature strains produced a crack 90 ft. long and of such width that one's fists could easily be inserted into it. This chimney was, like the vast majority of brick chimneys, made very much heavier than necessary.

There is perhaps nothing in which so great a proportionate saving can be made as in properly designing structures of this character. Almost any chimney of more than 125 ft. is an expensive apparatus. In the case of very tall chimneys the cost rises to large figures. There is a good deal of scientific engineering work done in chimney construction, but there is also a good deal that is careless and hap-hazard, based only on rule-of-thumb methods. The fact that few brick chimneys ever blow down, except in a catastrophe like the tornado at St. Louis, indicates that the ordinary chimney, like most ancient masonry structures, is provided with a great surplus of strength.

Zinc-Smelting Furnaces.

A good deal of attention is now being devoted to the electrothermic smelting of zinc ore. One process, that of de Laval, is already in regular operation in Norway; experiments are being made with other types of furnace both in Europe and America. The applicability of this method of smelting is largely a matter of the relative cost of the heat units finally utilized, as compared with the cost by the direct combustion of coal, but there are many practical details that must also be successfully developed.

The attempts to improve the method of zinc smelting are not, however, confined to the new field of electric heating. The old idea of smelting continuously in a blast-furnace is still being followed up. Some interesting experiments have recently been made, not yet with conclusive results, and others yet are to be made. They appear to be based on ideas that are sounder than those that were followed in earlier attempts, but there are so many confusing factors that may enter into this problem that no opinion should be expressed without an exhaustive study of the conditions. Practically we are not yet any nearer success in this direction, than we were many years ago.

In the meanwhile, so long as distillation must be conducted in the historic manner, the mechanical and commercial success of the operation depends upon the design and construction of the furnace, to afford the longest possible campaign and the minimum loss of heat; also upon the preparation of the retorts, with a view to making them as dense and durable as possible; and on details in furnace management, of which some system of mechanical charging, an improvement that has long been hoped for, appears the most promising.

Many types of furnace construction are in use, including some that date back three decades or more, but the Rhenish type in its several modifications appears now to have become the most approved form. This furnace is built with regenerative checker-work for both gas and air, as at Engis, Prayon, Overpelt and Pueblo; with regenerative checker-works for air only, as at Monteponi, although the Ferraris furnace employed there does not belong strictly to the Rhenish type; and with counter-current heat recuperation, as at Stolberg and Palmerton. All of these furnaces afford long campaigns and are economical in their consumption of coal. It is difficult to say definitely which one is the best, since they do not often receive competitive trials under the same conditions.

The regenerative furnaces of the Siemens system are undoubtedly the more economical of coal, but the advantage in that respect may be offset by the increased extraction of metal that is effected by the steadier temperature of a well designed counter-current system of heat recuperation. The difficulty of keeping the flues of the latter type tight, under the severe expansive strains of the furnace, is an inevitable drawback.

In the preparation of the retorts, the best results are obtained by hydraulic presses, as employed at all of the most modern smelteries. It is sought now to improve the quality of the retort material by the use of siloxicon, which in many respects is highly desirable, but so far is too expensive. Another expedient of much promise is the lining of hydraulically pressed retorts with special refractory material, whereby several advantages can be combined.

Metallics.

A wireless telegram was recently transmitted from the station at Newport, R. I., to the Washington navy yard, 320 miles away.

In the gasoline-engine cylinder, the highest temperature reported is in the neighborhood of 4,000° F. This is at the hottest portion of the exploding mixture of gas and air.

System and cleanliness around reduction plants foster pride and interest among employees; and the pride and interest of employees are factors in securing the highest success.

According to experiments made by Sir Alexander R. Binnie and described by him before the Institution of Civil Engineers in 1904, a concrete block of 1 sq. ft. cross-section, 100 ft. long expanded 0.005226 in. for each 1° F. rise in temperature.

In sprinkler systems using a shower of water as fire protection, the perforated pipes require from 3 to 8 quarts of water per inch of shower per minute, varying with the pressure and number and size of holes. A pipe 100 in. long requires from 75 to 200 gal. per minute.

Numerous silver-lead smelters now use salt cake for cutting out accretions in the furnace shaft. A small quantity of this powerful flux is charged around the periphery of the shaft and soon removes the hangings. This is found more satisfactory than the old practice of muscular metallurgy in barring down.

The heavy current required to start induction motors used for driving pumps in mine workings can be reduced to a large extent by putting a by-pass in the pipeline, so that the pump which has to start up under the full head of water will, until it has attained its normal speed, have to pump only a fraction of its regular load.

Tanks that are used about lixiviation plants are sometimes made into swimming baths by the workmen, and where this is the practice, difficulty is sometimes experienced in obtaining proper results from the process. Some of the tanks are used to the extent that the soap employed by the men in bathing has a deleterious action upon the process, and bathing in the tanks is prohibited on this account.

The decomposition of zinc sulphate, when heated with carbon, begins at 409° C., but is weak and lasts only a short time. It grows stronger with increase of temperature, but weakens perceptibly after a few hours. At 528° C., carbon appears to become decidedly active, but even then the effect is, at best, very slow and imperfect, as it is opposed by the tendency toward direct reduction of zinc sulphide.

Some minerals when rubbed together, or when scratched, emit light, and are said to be tribo-luminescent. The diamond sometimes exhibits this phenomenon in a marked manner. Sphalerite has long been noted for the wonderful tribo-luminesce displayed when simply scratched by the finger nail, and Sir William Crookes states that he has prepared an artificial sulphide of zinc which is even more responsive to friction than native sphalerite.

Tin, in steel, does not precipitate carbon in the form of graphite, as silicon and titanium do. In small quantities it is dissolved by the iron, but when its content reaches 5% it seems to form with it a definite stannide of iron. If more than 1½% of tin is present it makes the steel difficult to work, and over 2% precludes forging. This alloy is so brittle that a slight shock will cause fracture. On this account there is little or no practical use to which it is at present put.

Comparisons of tests made in California give the following relations between the local coal and crude oil: One gal. of California crude oil weighs 7.6 lb.; 42 gal. equals 1 bbl., and 2¼ bbl. weigh 718 lb. This is approximately equal to 1 short ton (2,000 lb.) of coal in actual use under the ordinary horizontal-return tubular boiler. In locomotive practice, 3¼ bbl. of crude oil (42 gal.), at 7.6 lb. per gal., is 1,037 lb., and this, it is stated, is approximately equal to 2,000 lb. of coal.

A trunk made for the use of an engineer has a compartment for a drawing board. The board is 26 by 38 in., to accommodate a drawing of the standard 24 by 36-in. size; the back of the trunk has a well or compartment 27 in. deep and 39 in. long—this is 3 in. wide and holds two drawing boards and their respective tee squares. The trunk is 16 in. wide inside, and holds enough "duffle" to take care of an extended trip. The top is flat, and serves as a support for the drawing board when it is in use.

The final tests of alignment and grade at the junction of the north and south headings in the Simplon tunnel were made on Aug. 15. The two axes missed each other by 20.2 cm. (8 in.) in alignment, and by 8.7 cm. (3½ in.) in level. The length obtained by triangulation was 19,756.31 meters (12.27 miles); the measured length is 19,755.52 meters, an error of 0.79 meter (2.6 ft.). It took 19 hours to determine the errors in the axes on account of the vapor rising from the hot springs toward the middle of the tunnel.

The Huntington-Heberlein installation of the American Smelting & Refining Co., at Pueblo, Col., comprises 10 pots. Similar installations are being made at East Helena, Mont., and at Murray, Utah. The process is also being introduced at certain of the Mexican works of the company. A 10-pot plant is supposed to have capacity for the desulphurization of 90 tons of galena per 24 hours. The Huntington-Heberlein process is finding extensive application in British Columbia. It is in successful use at Marysville, and the Canadian Smelting Works is now introducing it at Trail.

The use of tanks that are over six or seven feet in depth about some plants, is attended by a risk that is not often recognized. This is true of tanks holding water, that offer temptations, during the heated term, to those who would indulge in swimming. We have known of a case where a 15-ft. tank, a little more than half-full of water, was used for this purpose by a workman who dived into it from the top. He could neither obtain a hold upon the smooth interior, nor attract the attention of anyone about the establishment, but was only able to swim about in fruitless exertion until, exhausted, he finally succumbed.

Prof. H. O. Hofman has determined the decomposition temperature of zinc sulphate to be 739° C. Ordinary zinc sulphate becomes almost completely anhydrous at about 263° C., the expulsion of water progressing rapidly with rise in temperature above 100° C. The decomposition of anhydrous zinc sulphate begins at 528° C. All his experiments pointed to the conclusion that, contrary to the statements in almost all of the older metallurgical treatises, stable anhydrous basic zinc sulphates do not exist. The sulphur trioxide of the normal sulphate passes off gradually without any decided interruption, as the temperature is raised to complete decomposition.

Chilean mills develop centrifugal energy in the rollers proportionately to their weight and speed. This energy must necessarily be restrained by some means. If the restraining is done by an outward pull on a level and radial axle, none of the centrifugal energy is utilized in the crushing, but is entirely lost to it. To minimize this loss different means are employed. What is known as the Manty axle is behind and parallel to a radial line, thus pointing the roller inward on its circular path; by this the restraining force is diverted to the path or bed by a partial sliding motion along with the rotating. To the extent of its sliding it is a grinder, and wears metal away as a grinder. Another method that partially utilizes the centrifugal energy is to attach the axle to the central driver through the medium of a trunnion at right angles to but below the axial line. In this case, however, the weight below the trumion level, with its equivalent above, is centrifugally restrained by the trunnion and only the excess weight above is diverted to the crushing. Another way of applying the centrifugal energy to the crushing is to incline the roller inwardly. If the speed and the inclination are adjusted to balance, all the restraining energy is utilized in the crushing.

Colliery Notes.

The primitive method of making coke—in heaps, somewhat after the manner of charcoal burning—is exceedingly wasteful of coal, and correspondingly slow in operation. It takes from 5 to 8 days to coke a mass occupying a pyramid whose base is about 15 ft. square. Of this amount, about 60% is lost in coking.

Coal in Bolivia is reported to cost $40 per ton, and a British consul there reports that the high price has resulted in the importation from Germany of many gas-producers and gas-engines to take the place of steam-engines. Anthracite is used for this work; according to reports, it shows considerable economy in the cost of power which is produced in this manner.

The thick coal seams in some parts of Pennsylvania are worked by the pillar-and-stall method. A space on either side of each breast is reserved as a roadway, and the breasts are from 25 to 35 ft. wide, the pillars being from 10 to 15 ft. thick. This method is applied to seams having considerable inclination to the horizontal; where the seam is very thick, sufficient loose coal is left on the floor to serve as a working platform for the miners.

In coal-cutting machines operated by compressed air, the exhaust ports used to give trouble by freezing, due to the entrained moisture and to the small cross-section of the passage. This is not the case at present. Most of the modern machines are so designed that the expansion is more gradual, and the cooling effect less local. Trouble of this sort is rare except in cold workings, when the natural temterature is low enough to add a cumulative effect. The heat developed in the compression cylinders, and the cold produced in the expansion cylinders of compressed-air machinery, furnish interesting examples of "the conservation of energy."

Goaf blasts, caused by falls of roof, are more frequent in Indian mines than is the case in British and American mines; this is on account of the nature of the hard sandstone roof, which allows of large areas of coal being worked before a fall of roof takes place. The old system (and the one extensively followed now in some districts in working Indian collieries) is to commence from the shaft, or from the adit, where the coal crops out, and drive headings and rooms, forming pillars 20 to 100 ft. square, until the whole of a district is thus cut into pillars. The pillars are then removed, commencing from the boundary and working back toward the shaft. As a rule, several pillars are removed before a fall of roof takes place. On almost every occasion when the roof breaks down a heavy blast of air is produced; but fortunately, fatal results are rare.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Sulphur Trade.

Sir—The recent editorial upon the "Sulphur Trade," which appeared in this JOURNAL (Oct. 7, 1905, p. 641), has interested me, in common with other shareholders in the Anglo-Sicilian Sulphur Company, and has led me to make investigation which has convinced me that some of the statements contained in the article in question require modification. Upon the principle of *audi alteram partem*, I venture to ask you to permit me to express my views upon some of the most vital points.

It is true that a working agreement has been arrived at as between the Anglo-Sicilian Sulphur Company and the Union Sulphur Company, which controls the output of Louisiana, but the statement that the American trade, together with a portion of the European trade, has been entirely accorded to the latter company under agreement in question is wholly inaccurate. As a matter of fact, I learn that the American trade is divided in an agreed ratio until August next between the two companies, and power is given to the Union Sulphur Company to dispose of a small proportion of its American quota in European markets. This latter arrangement was made with a view to prevent the entire obliteration of the European agency which had been established in Germany by the Union Sulphur Company, prior to the existing agreement.

The agreement further provides for equality of selling price, based upon the sulphur content of the products respectively sold by the two companies. This was necessitated by the fact, as the result of the ingenious process of extraction adopted, that the Louisiana sulphur is submitted to a process of refining before it reaches the surface. By means of superheated water, conveyed by pipes to the deposits, the sulphur is first melted, thereby being separated from all associated impurities which are insoluble in water. The refined and molten sulphur is then raised to the surface by means of an air-lift contrivance. Sicilian sulphur, on the other hand, is mined in the ordinary way; it is then subjected to fusion, being melted out from its associated gangue. A small proportion of foreign matter, seldom exceeding 1½%, attaches to the sulphur in its fused condition; in order to place crude Sicilian sulphur upon a selling equality with refined Louisiana it is now sold upon a sulphur-content basis by which means a parity of prices is established.

The suggestion that the agreement, above referred to, was made by the Union Sulphur Company upon humanitarian grounds, and with a view to assist the crippled industry of Sicily, has been received in that Island with considerable amusement. If it be so, it is certainly one of those rare cases in which the exercise of charity and the enjoyment of satisfactory profits go hand in hand. A war of rates had already commenced and was about to be vigorously prosecuted on both sides. Prudent counsel, however, realized that the great stock of the Anglo-Sicilian company, together with its large accumulated reserve, constitutes a fighting force of no mean order, particularly when it is realized that, at least until the expiry of the contracts with the Sicilian producers, they would be compelled to sell as much as possible in order not to get top-heavy; a study of their balance sheet revealed the fact that they could sell perhaps as low as $8 per ton f. o. b. Sicily, without prejudicing the capital of their preference shareholders.

The fortunate, but wholly unexpected, arrival in Europe of the president of the Union Sulphur Company during the early stages of the war of rates, rendered possible the conclusion of a treaty of peace, which, I understand he has since declared, has come to stay. Be this as it may, it is certain that whatever may have been the combined fighting forces of the Sicilian producers and the Anglo-Sicilian Company when the existing agreement was framed, they will be enormously strengthened when the Italian government, in accordance with its intention, shall have improved, by way of legislation, the position of the Sicilian producer in respect of the reduction in railway rates, taxes, etc., and after the Anglo-Sicilian Company, in addition, shall have considerably augmented its accumulated reserve. It will then be necessary to decide whether Sicily or America, between them, needs to produce more sulphur than is required for the world's consumption; and what the loss to the producers in both countries would mean if the existing stocks were liquidated under compulsion.

The imposition, by the United States government, of a tariff upon imported sulphur has already been mooted in the press by interested parties; but it is fully recognized that, while such a duty might be a temporary advantage to the Louisiana company, it would react disastrously upon the paper industry as well as upon newspaper enterprise in the United States. I am informed that the position is being closely watched by those most interested in this connection in the United States.

R. T. BAYLISS.

London, England, Nov. 3, 1905.

Cupellation and Parting.

Sir—In my paper in this JOURNAL (Aug. 15, 1905), paragraph "Parting," p. 246, line

13, etc., should read: "In assaying tailing or residue, it is usual to have a large excess of silver; consequently, the gold is liable to break up in parting with nitric acid."

H. R. EDMANDS.

Menzies, West. Aus., Sept. 23, 1905.

The Oregon Copper Belt.

Sir: Baker county, in Oregon, is showing promising veins of copper ore. Eastern Oregon has good mineral resources; the gold mines in the Blue mountain country have attracted attention. The Cornucopia, Bourne, Sumpter, Red Boy, Greenhorn, Quartzburg and Prairie City camps are doing well, and with a comparatively small amount of scientific development. Attention is now turned to copper in the belt just east of Baker City. Interest in this copper belt is augmented by the reports of schemes to furnish this district with railroad transportation. There are several Eastern capitalists interested, who keep their own counsel, hire teams and investigate the copper belt for themselves.

This copper belt extends diagonally from the Snake river, near Homestead, where junction is made with the Seven Devils copper country of Idaho, northwesterly, partially paralleling the Powder river into Union county, with branch lodes extending into the Imaha district of Wallowa county, where the Snake river is again encountered. After this it makes a bend through the Clearwater country and into Lewiston. The belt is well watered and timbered; for the most part it lies at a mean altitude of 3,400 ft. above sea-level, and is little troubled with snow or transportation difficulties in the winter time.

Frank Hills, of Erie, Pa., a recent explorer of this country, says that the North American Mining Co.'s property at the town of Burkemont is under the management of D. W. C. Nelson. There is a town laid out there, with post-office and other conveniences. The company's property includes 19 claims unpatented, and 80 acres of patented mineral ground; surface work shows copper ores. The principal building is the shaft-house, which is large and convenient. There is plenty of water, wood and timber. Burkemont lies in the center of the Powder river copper belt; it has a large outcrop. The North American is equipped with machinery to work to a depth of 500 ft., including hoist, pumps, air-compressors, drills, etc. The shaft is 165 ft. deep; the management proposes to sink to the 300- or 400-ft. level and run crosscuts in both directions to get the ore vein on the lime dikes.

The Indiana Mining Co., under the management of W. J. Messner, is 3 miles northwest of the North American and 1½ miles south of Medical Springs. It has just established its new hoisting plant, and has its shaft down 300 ft., where it is in sulphide copper ore. The Indiana is a promising mine. The ore ledge is large and the values run from 4.5% up in copper, with enough gold and silver to be worth noting. The purpose of this company is to block out ore to run a large mill plant before putting on additional machinery.

The Goose creek country, 5½ miles southeast of Burkemont, has several good properties on this same copper belt. Cox & Gwinn, A. Love, Foster & Thomas, the Cleveland syndicate—are all developing large groups of claims. This copper belt continues down Powder river and spreads out on Snake river, where there are large properties opening, with one or two producers, notably the big Iron Dike mine, which is now getting ready to ship. Near it are the MacDougall and Butz properties; many other smaller claims are being developed in that vicinity.

From a conservative standpoint, this copper belt seems to give promise for the future.

C. W. C.

Baker City, Ore., Nov. 4, 1905.

The Guanacevi Company—An Explanation.

Sir—I have lately received clippings of advertisements from the New York *Herald* of Oct. 22 and *The Daily Banker and Stockholder* of Oct. 13, in the former case inserted by Barnard Clark of No. 25 Broad street, which is also the office of The Guanacevi Finance Company, and in the latter by the Guanacevi Tunnel Company. In the *Herald* advertisement it is stated that I am consulting engineer of the Guanacevi Tunnel Company and in the *Banker and Stockholder* the manifest object is to convey the impression that I am officially connected with the company.

In February last I was persuaded to accept the position of consulting engineer for the company, and on Sept. 15 I severed my connection. The widespread and unauthorized use of my name and my connection with technical societies, for advertising purposes, and the consequent unfavorable impression naturally made upon my professional and business friends impels me to ask you to publish this letter. It is due to myself and to my many friends in the profession, whose good opinion is to me "above all price," that they should know the history of my unfortunate connection with the Guanacevi Company.

Previous to leaving New York, in February, a representative of the company laid before me a typewritten prospectus of the Guanacevi Tunnel Company containing my name as consulting engineer, together with my official position as vice-president of the American Institute of Mining Engineers. I peremptorily forbade the mention of my official connection with the Institute. He then promised to comply with my request. I also strongly opposed the publishing of a prospectus until after my investigation of the property.

During my absence in Mexico my request was absolutely disregarded, and the prospectus as originally blocked out was published and sent broadcast.

Before I began the examination, an advertisement by the Guanacevi Tunnel Company's agent in Chicago apeared in a Denver paper, in which it was stated that I fully endorsed the wild statements made in the advertisement.

At the first meeting of the board of directors, after my return to New York, I characterized the bad faith of the company's representative in fitting terms and then stated that I would sever my connection with the company if my name was continued in the prospectus as it then stood, and at the same time I strongly urged its entire suppression. The promise was then made that every effort would be exerted to call in the prospectuses already issued, and that no more would be sent out.

It subsequently transpired that the same, unaltered, prospectus was being distributed from the office of the Guanacevi Finance Company. When this came to my knowledge, I immediately sent in my resignation, and at the same time sent notices of the fact to the principal mining papers.

I trust that my experience will be a warning to other members of the profession who may unwittingly be seduced into acting for mining companies who issue "opera bouffe" prospectuses.

GEO. W. MAYNARD.

Altar, Sonora, Mexico, Nov. 6, 1905.

Cupel Absorption.

Sir—Herbert R. Edmands, in discussing the shape of cupels, in this JOURNAL (Aug. 12, 1905, p. 245), says: "Most of the cupels and cupel-molds sold are of faulty design, the cup being usually too deep." He then gives results which show that cupellation proceeds more rapidly on shallow cupels than on deep ones. He does not, however, give the cupel absorption of gold and silver in the two cases. The general experience is that the losses are less in deep cupels. In the cupellation assay, the aim is rather to get accurate results than to save time. Moreover, the assayer's time is usually not wasted while cupellation is proceeding. For these reasons deep cupels are generally preferred to shallow ones, and for bullion assays at the Mint we have recently adopted still deeper ones than before (see this JOURNAL, Sept. 16, 1905, p. 492).

Mr. Edmands also says that I have shown (this JOURNAL, April 13, 1905, p. 708) that London-made cupels of bone-ash are better than Deleuil's or than magnesia cupels. I do not think that any such interpretation can be put on the results of my experiments. The natural conclusions seem to me to be that all cupels are "tarred with the same brush"; that in ore assays, cupel absorption counts for more than is generally recognized; and that the percentage losses (which are small when large beads of gold and silver are cupelled) are

too heavy to be disregarded when beads weighing a few milligrams or less are in question. I am afraid that this will prove to be the case whatever may be the material used for making the cupels.

The losses can be determined in one of two ways: either by the use of check assays, or by fusion of the cupels. Check assays have been employed by bullion assayers for the last half century and will, I suppose, be adopted by ore assayers some day. The need in their case is far more pressing than in bullion assaying. The accurate valuation of ores is now almost as important as that of bullion; but, if proofs are omitted in all cases, an error of 5% in an ore assay is more likely to pass unobserved than one of 0.5% in a bullion assay. The chief objection to the use of check assays on ores is the loss of time involved. The answer to that is that untrustworthy assays are very little better than none at all. No assay can be considered as trustworthy if cupel absorption is disregarded. T. KIRKE ROSE.

Royal Mint, London, Oct. 9, 1905.

New Publications.

Electric Mining Rules and Data.—Pages, 95; illustrated. 3 by 5 in., paper. Manchester, England: W. T. Glover & Co., Limited.

The Dike Rocks of Mysore (Memoirs, Vol. II, Mysore Geological Department.) By E. W. Wetherell. Pages 108; illustrated. 7½ by 10 in.; paper. Mysore, India, 1905: The Geological Department.

Field Measurements of the Rate of Movement of Underground Waters. Water Supply and Irrigation Paper No. 140. By Charles S. Slichter. Pages, 122. Illustrated. 5½ by 9 in., paper. Washington, 1905: Government Printing Office.

Journal of the Association of Engineering Societies. Vol. XXXV, No. 2, August, 1905. Pages, 27. Illustrated. 6 by 9 in., paper, 30c. Boston, 1905: Fred. Brooks, Secretary of the Board of Managers of the Association of Engineering Societies.

Contents.—Timber tunneling in quicksand. Discussion. Engineering ethics and fees. Obituary.

Die Stahlindustrie der Vereinigten Staaten von America (in its present relations to production and markets). By Hermann Levy (privatdozent of national economics in the University of Halle, Germany). Pages, 369. 6½ by 9½ in. $3.75. Berlin, 1905: Julius Springer.

This is an exhaustive study (from the German standpoint, and in the interest of political economics) of the phenomena of the iron and steel industry, as related to the national resources of the country, and as influenced by the conditions of the tariff and the tendency toward centralization of the trade. American authorities are freely quoted, and the spirit displayed by Prof. Levy is that of candor and careful research.

The Configuration of the Rock Floor of Greater New York. Bulletin No. 270, United States Geological Survey. By Wm. H. Hobbs. Pages, 96 + IV; illustrated. 6 by 9 in., paper. Washington, D. C., 1905: Government Printing Office.

This brochure is a summary, presenting in graphic form, the results of various test borings made in the district indicated. The publication will find extended use in the offices of engineers who have foundation work to carry on in the vicinity covered by it. It should form a valuable aid in the making up of approximate estimates for work of the character specified, though the maps given are rather small for this purpose. It is a distinct and useful addition to our knowledge of the substrata underlying New York.

Report of the Board of Rapid Transit Railroad Commissioners for the City of New York for the Year Ending December 31, 1904. Pages, 375. Illustrated. 7 by 10 in.; paper. New York, 1905: Clarence S. Nathan.

Contents.—Report of the Board of Rapid Transit Railroad Commissioners. Commissioners and staff. Proceedings of opening of rapid transit railway. Opinions of the court in suits brought against the board. Correspondence relating to proposed new routes. Reports in reference to rolling stock and safety appliances. Certificate of the board to the New York Connecting Railroad Company. Certificates of the board to the New York & Jersey Railroad Company (Sixth avenue and Ninth street extensions). Report of chief engineer. Report of auditor. Index.

Handbook of Metallurgy. Second edition. Vol. I. By Carl Schnabel (professor of Metallurgy at Berlin). Translated by Henry Louis (professor of mining at Armstrong College, Newcastle-upon-Tyne, England). Pages, 1,123. 6 by 8¾ in. Illustrated. Cloth. $6.50. London: Macmillan & Co., Ltd. New York: The Macmillan Co., 1905.

This is a translation of the first volume of the second German edition, which appeared in 1901; the second volume of the German edition appeared in 1904, and its translation will appear early in 1906. It will be recalled that the first English edition appeared in 1898 and was quickly exhausted. This volume of Schnabel is part of what seriously aims to be a "single complete treatise on metallurgy." The volume, in both the first and the second edition, considers the subjects of copper, lead, silver and gold. In the first edition the indices, both geographical and subject, were found at the end of the second volume; but in the new edition the first volume is wisely provided with its own indices. This is a great improvement in making it useful as a working manual. The general style of treatment in the new edition is similar to that of the old, but with extensive revision and addition, both of old matter neglected in the former edition, and of new material which has appeared with the growth of practice. Some measure of the scope and thoroughness of the book may be gained by a comparison of the pages devoted to each metal, which are as follows:

Copper, old, 247 pages; new, 369; an increase of 35% of descriptive matter. Lead, old, 180 pages; new, 203; an increase of 14%. Silver, old, 296 pages; new, 339; an increase of 16%. Gold, old, 122 pages; new, 173; an increase of 41% in reading matter. Taken as a whole, the old volume I had 873 pages of descriptive matter; the new has 1,901 pages; an increase of nearly 25%. The illustrations in the old edition of volume I were 569 in number; in the new, 715; an increase of over 25%. This, to be sure, is only a mechanical method of estimate; but it is enough to show that the author has made a serious attempt at thoroughness. In preparing a manual of the whole field of metallurgy in one treatise, it is impossible to provide the respective topic with that thoroughness which is possible when one or several volumes are devoted to a single metal, as is often the case with iron, lead, zinc, copper, aluminum, tin, etc.; but, considering the scope attempted and the purpose of providing the student with a reliable handbook of exact and ready reference, it can safely be said not only that this treatise of Schnabel's is alone in the field it aims to occupy, but it is the one treatise that the young student should first secure, the one to which the old and busy worker will turn for quick general reference. The paper, printing and illustrations are all of the high grade that we are accustomed to associate with the house which publishes the book.

Questions and Answers.

The "Baptist Cone."

An old timber-man (who used to get out the rough logs for stulls and collars in mine-timbering) once told me that a "Baptist cone" was used for handling them. Can you tell me what he referred to? J. G.

Answer.—The baptist cone is a sheet-iron or steel cone, open at its large end and having at its apex a hole through which a chain is passed. It is used extensively in logging operations, and effects a radical saving of time and trouble. In use, the chain is hooked around one end of the log to be hauled out of the forest and the other end is attached to a cable run from the winding engine. The cone acts as a pilot, and, butting against the log at the end, makes it possible to ride over, through and around obstacles that would otherwise have to be removed at considerable expense.

The American Mining Congress.

The eighth annual session of the congress was held at El Paso, Texas., Nov. 14 to 18, inclusive. The advertised program included the following papers:

Amendments advisable to the Federal mining law; R. S. Morrison, of Denver, Colo., author of "Morrison's Mining Rights."

Co-operation between State mining schools and State mining bureaus; Victor C. Alderson, president Colorado State School of Mines, Golden, Colorado.

The zinc industry of the Missouri-Kansas fields; C. M. Shartel, Neosho, Missouri.

Copper smelter smoke; W. S. Thomas, chemist of the Bingham Smelting & Refining Co., Bingham, Utah (with experiments by Lewis A. Merrill, Geo. A. Kerwin and James A. Leslie).

An Eastern exhibition of minerals and mining machinery by the American Mining Congress; W. M. Porter, Chicago.

The attitude of Eastern capital toward Western mines in the development stage, and how to attract it; Frank E. Wire, Libertyville, Illinois.

The quicksilver deposits of Terlingua district, Brewster county, Texas; Wm. B. Phillips, president Texas State Mining Association.

Mineral resources of New Mexico; Fayette A. Jones, United States Geological Survey, Albuquerque, New Mexico.

Mine drainage districts; E. Lyman White, State commissioner of mines, Denver, Colorado.

Forestry as it affects the mining industry; R. E. Benedict, inspector United States Forestry Service, Thatcher, Arizona.

Advantages of greater co-operation between the United States Geological Survey and State mining bureaus; Chas. D. Walcott, director United States Geological Survey, Washington, D. C.

Prevention of mining frauds by State legislation; Lewis E. Aubury, State mineralogist, San Francisco, California.

Relation of mining and smelting between Mexico and the United States; Jas. W. Malcolmson, El Paso, Texas.

Ores worthless twenty-five years ago which have been made valuable by improved mining methods; Prof. Wm. P. Blake, of Tucson, Arizona.

The examination of mines preliminary to purchase, of today, as compared with twenty-five years ago; Robert Gilman Brown, San Francisco, California.

Mine management today as compared with twenty-five years ago.

A national department of mines and mining.

Special address; C. J. Norwood, director Kentucky State Geological Survey, Lexington, Kentucky.

Proposed remedy for the difficulties arising from inaccurate records of patent surveys; A. J. Hoskin, assistant professor of mining, Colorado School of Mines.

Abstracts of Official Reports.

El Oro Mining & Railway Company, Ltd.

The report of this Mexican gold mine covers the year ending June 30, 1905. It is to be comended for its completeness.

Development during the year comprised 6,763 ft. of drifts (one-third of it in barren matter); 6,044 ft. of crosscut (one-fourth in ore); and 3,209 ft. of vertical work, mainly in ore. The total length of all workings now in the mine is 15⅓ miles. Reserves of ore definitely known were estimated at the end of the year to be 672,850 tons, with an average value of $9.30 in gold, besides 3 oz. silver. Reserves of the high-grade ore are diminishing, while new openings are revealing mainly ore of lower value; thus, in the "hanging-wall orebody," and in the "branch vein," whose gold content averages $14.70, only 97,800 tons remained at the end of the year, the rest of the reserve averaging $8.30 in gold to the ton.

Improved resources are anticipated in the Somera No. 1 claim, lying to the west of the existing mine, on which development has been begun within the year. A crosscut into this ground from the Somera shaft has already cut three new veins, and others, already developed on other properties adjoining on opposite sides of the Somera claim, are confidently looked for.

Of the 142,181 tons of ore broken and hoisted from the mine, the "hanging-wall" and the "branch" vein, the two higher-grade ($14.70) orebodies, gave 104,104 tons, the remainder consisting of low-grade ($8.30) ore from other lodes. The stopes on the 186-ft. and 286-ft. levels, in the "hanging-wall" vein, are exhausted.

The company has two stamp and cyanide mills, the second of which came into full operation in May, 1905, its construction having cost $746,537 within the last two years. The new mill has 100 stamps, and is making a trial of three tube mills. Two-thirds of the ore is reduced to slime, and the remaining sand is ground to between 100- and 200-mesh. An improved extraction of both gold and silver is observed as a result of this practice. The older mill ran throughout the year, its slime having been diverted to the tanks of the new mill as soon as these were ready. Milling operations may be summarized thus:

	No. 1.	No. 2.
Days run	348.5	71.7
Tons crushed	122,006	20,565
Tons per stamp per 24 hrs.	3.34	2.26
Assay value of ore:		
Gold	$12.91	$9.16
Silver	2.50	1.80
Percentage of extraction:		
In mill—Gold	12.64%	6.49%
Silver	1.75%	3.19%
By cyanide—Gold	66.00%	70.24%
Silver	52.50%	56.45%
Total gold	78.64%	76.73%
" silver	54.20%	59.64%
Total value of ore	$2,069,684	
Total recovery of bullion	$1,527,723	
Additional from slag, old plates and concentrate	$16,114	

The apparent inferiority of the new mill in saving gold, the average being for the first three months of its campaign, does not exist at present. In June, the last month recorded, it was saving 80.3% of its gold.

Costs of mining and development were augmented, but the expenses of milling and cyaniding were decreased during the year. The costs per ton, on the basis of 142,571 tons mined, were as follows:

Mining	$2.00
Development	1.11
Milling	1.00
Cyaniding	1.21
Miscellaneous operating	0.25
General	1.27
Water supply	0.03
Total	$6.87

Electric power is contracted for with the Mexican Light & Power Co., and motors are being delivered by the Westinghouse company. The use of this power is expected to reduce working costs to $5 per ton and to repay the cost of installation in two years; it was to be in operation in October.

The railway has been restored to good condition, which was impaired by the heavy rains of last year. The operation of the railway netted $40,686 for the year.

The company's authorized capital is £1,150,000, of which £1,080,000 has been issued. Net earnings for the year were £122,810, adding to which the balance from the previous year gives a total of £124,532. In view of heavy construction expenses, no dividends were declared; income-tax absorbed £5,853, and depreciation to the extent of £86,619 was written off, leaving £32,058 as a surplus to carry forward.

Homestake Mining Company.

This company owns a large property in the Black Hills in South Dakota. The ore is low-grade gold ore, which the company has been successful in mining and working at a profit. The capital stock authorized is $22,000,000, in shares of $100 par value. Of this stock 218,400 shares are outstanding.

The report for the year ending June 1, 1905, shows that 1,398,100 tons of ore were mined and treated, yielding $5,221,089 in bullion, an average of $3.734 per ton.

The income account is given in the report in considerable detail, but in a rather involved form, which makes it difficult to separate the expenses properly. A fair statement of earnings and expenses is as follows:

	Amount.	Per Ton.
Bullion account, total receipts	$5,221,089	$3.734
Miscellaneous receipts	81,249	0.058
Total expenses	$5,302,338	$3.792
Mining expenses and charges	$2,492,257	$1.782
Milling expenses and charges	600,685	0.430
Cyanide expenses and charges	345,349	0.247
General and miscellaneous	295,396	0.211
Total expenses	$3,733,687	$2.670
Net earnings	$1,568,651	$1.122

The expenses were 70.4% of gross earnings. Of the expenses a total of 66.8% is charged to mining; 25.3% to milling and cyaniding; 7.9% to general and miscellaneous expenses, which include repair shops. The disposition of the net earnings was as follows:

Net earnings, as above.....	$1,568,651
Bills payable paid.....	$500,000
Debit balance from previous year.	18,317
Dividends paid, $3.75 per share..	819,000
Total disbursements.....	$1,337,317
Cash on hand, June 1, 1905..	$231,334

The report of Superintendent T. J. Grier says: "During the twelve months now closing, no mishap to the property of special importance occurred. Developments in various parts of the mine progressed steadily and satisfactorily. The ore at the 1,250 level has just been reached, and is now being crosscut. The Ellison shaft has been sunk to 1,400 ft., and the work of opening a level at that depth begun. The B. & M. shaft has attained a depth of 1,250 ft.; the Golden Prospect, 900 ft. The Old Brig and the Golden Gate remain at 800 ft. each, and the Golden Star at 1,100 ft. The plant, generally, is in fine condition, and everything about it is running smoothly, with ore reserves for a great many years."

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications, correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Nov. 7, 1905.

803,543. ELECTROLYTIC PROCESS USING INSOLUBLE ANODES.—Anson G. Betts, Troy, N. Y.

803,544. APPARATUS FOR REFINING LEAD BY ELECTROLYSIS.—Anson G. Betts, Troy, N. Y.

803,550. SUBMERGED-SCREEN SIZER AND SEPARATOR.—John M. Callow, Salt Lake City, Utah.

803,563. CLAY-CLEANING DEVICE.—Hermann Diesener, Charlottenburg, Germany.

803,586. COKE-EXTRACTOR.—John S. Ham, Covington, Va., assignor to Covington Machine Company, a corporation of Virginia.

803,587. DREDGING APPARATUS.—Robert G. Hanford, San Francisco, Cal.

803,588. PUMP FOR MOLTEN METAL.—Hans C. Hansen, Newton, Mass.

803,597. DEVICE FOR OPERATING FURNACE-DOORS, GATES, ETC.—Joseph S. Hood, Stahlstown, Pa.

803,608. PEAT-MACHINE. — Thomas H. Leavitt, Boston, Mass.

803,620. PROSPECTOR'S PICK AND AX.—James McMahon, Revelstoke, Canada.

803,628. REVERSING-VALVE FOR SMELTING AND OTHER FURNACES.—Reinhold Schneider, Sharon, Pa.

803,634. SAFETY DEVICE FOR ELEVATORS.—James W. Smith, Jr., Bodaville, Kan., assignor of one-half to Wm. Wiese, Bodaville, Kan.

803,643. TRAVELING APRON OR CONVEYER.—Isaac Trolley, Grantham, England.

803,650. REFUSE-BURNER.—Frederick G. Wiselogel, Indianapolis, Ind., assignor to Sanitary Reduction & Construction Company, Boston, Mass., a corporation of Massachusetts.

803,651. PROCESS OF MAKING AMMONIA BY SYNTHESIS.—Herman C. Woltereck, Westminster, London, England, assignor to the Eschweiler-Woltereck Process Syndicate, Ltd., London, England, a corporation of England.

803,652. PROCESS OF MAKING AMMONIA BY SYNTHESIS.—Herman C. Woltereck, London, England, assignor to the Chemicals Proprietary Company, Ltd., London, E. C., England.

803,653. PROCESS OF MAKING AMMONIA BY SYNTHESIS.—Herman C. Woltereck, London, England, assignor to the Chemicals Proprietary Company, Ltd., London, E. C., England.

803,673. APPARATUS FOR ROLLING SHEET AND TIN PLATE.—Percy E. Donner, Columbus, Ind.

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803,681. HOISTING APPARATUS.—Patrick J. Fahey, Albany, N. Y.

803,690. ELEVATED CARRIER.—Mathew Heus, Calumet, Wis.

803,703. DEVICE FOR BUILDING CONCRETE WALLS.—David A. Milam, Kansas City, Mo.

803,721. MIXING-MACHINE.—Thomas L. Smith, Milwaukee, Wis., assignor to the T. L. Smith Company, Milwaukee, Wis., a corporation of Wisconsin.

803,737. FURNACE FOR SMELTING ORE.—Ralph Baggaley, Pittsburg, Pa.

803,745. APPARATUS FOR ROLLING SHEET AND TIN PLATE.—Percy E. Donner, Columbus, Ind.

803,763. BEARING FOR THE ROLLS OF ROLLING-MILLS.—John T. Horner, Newcastle, Pa.

803,792. PROCESS OF UTILIZING FURNACE-FLUE DUST.—Samuel B. Sheldon, Buffalo, N. Y.

803,830. ORE-CONCENTRATOR.—James J. Kennedy, Guthrie, Okla.

803,868. GOLD-SAVING APPARATUS.—William D. Baney, Tonopah, Nev.

803,886. TREATMENT OF IRON ORES, ETC.—Carleton Ellis, New York, N. Y.

803,903. ORE-CRUSHING MACHINE.—George Johnston, San Francisco, Cal.

803,904. METHOD OF HYDRATING LIME.—John G. Jones, Carthage, N. Y.

803,911. ROCK-CUTTING DRILL-BIT.—John G. Leyner, Denver, Colo.

803,921. ALLOY.—Frederic W. Moffett, Bloomfield, N. J., assignor of one-half to Howard M. Thomas, Bloomfield, N. J.

803,934. QUICKSILVER-TRAP. — Philip Somerville, Bishop, Cal.

803,944. CONVEYING APPARATUS.—Thomas Wallace and Frank Nash, San Francisco, Cal.

803,977. SEPARATOR-SIEVE.—William C. Black, Plymouth, Ohio.

804,002. GAS-BLOWPIPE.—Edmond Fouché, Paris, France, assignor to Eugene Alfred Javal, Paris, France.

804,006. PROCESS OF MAKING ZINC ALLOYS.—Paul Gührs and Albrecht Gührs, Berlin, Germany.

804,016. METHOD OF REVIVIFYING SPENT CLAYS.—Alfred B. Latting, Memphis, Tenn.

804,021. MEANS FOR PRODUCING OXIDES OF NITROGEN.—Ernst Marquardt, Schoeneberg, near Berlin, and Hermann Viertel, Charlottenburg, Germany.

804,022. APPARATUS FOR MIXING SUBSTANCES TOGETHER IN REGULAR PORTIONS.—Thomas D. H. May, Bath, England.

804,023. COUPLING-BOX FOR ROLLS.—William C. Millhizer and Frederick McQuiston, Pittsburg, Pa.

804,026. LOADER.—Joseph C. Mire, Belle Helene, La.

804,034. PROCESS FOR THE MANUFACTURE OF ARTIFICIAL PEARLS, ETC.—Paul E. L. Perdrizet, Paris, France.

804,048. CHUTE.—Edmund Roenius, Grand Rapids, Wis.

804,053. COKE-OVEN.—Mathew E. Rothberg, Ceveland, Ohio.

804,054. COKE-OVEN.—Mathew E. Rothberg, Cleveland, Ohio.

804,076. ROTARY KILN.—William R. Warren, New York, N. Y.

804,080. APPARATUS FOR MAKING STEEL AND OTHER METALS.—Edwin C. Wills, Trenton, N. J.

804,092. APPARATUS FOR DRAINING MARSHES AND THE LIKE.—John Brants, Tampico, Ill.

804,141. EARTH-AUGER.—Emery B. La Mont, Ashton, S. D.

804,158. FUEL-FEEDING APPARATUS.—José F. de Navarro, New York, N. Y., assignor to Herbert J. Travis, Brooklyn, N. Y.

804,159. AIR-COMPRESSOR.—Christian Neumann, St. Louis, Mo., assignor to the Natural Power Company, St. Louis, Mo., a corporation.

804,160. DEVICE FOR FEEDING PULVERIZED FUEL.—Everett J. Neville, Cleveland, O.

804,185. COUPLING FOR WELL-DRILLING TOOLS.—Erwin A. Davison, Stockton, Cal., assignor to the Universal Nut-Lock Company, Stockton, Cal., a corporation.

804,186. PROCESS OF TREATING ORE-SLIMES, ETC., CONTAINING GOLD, SILVER, OR OTHER VALUES.—Louis J. Drabek, Turner, S. D.

804,193. PROCESS FOR MANUFACTURING BRIQUETTES.—Gottfried Hoepfner, Bleckendorf, Germany, assignor to Willy von Lewinski, Breslau, Germany.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Oct. 28, 1905.

20,877 of 1904. ELECTROMAGNETIC SEPARATOR.—A. Goodwin and W. J. Hollidge, London. Improvements on electromagnetic separators intended for separating weakly magnetic bodies such as wolfram from their ores.

21,018 of 1904. INSULATING PROCESS.—J. F. Bottomley and A. Paget, Newcastle-on-Tyne. Method of casting fused silica upon metals so as to insulate the metals.

23,663 of 1904. STEEL FURNACE.—N. K. Peace, Sheffield. A steel milling furnace using liquid fuel.

24,386 of 1904. ARRANGEMENT OF MACHINERY.—R. Stanley, Nuneaton. An arrangement of a series of crushing rolls and screens, so that the ore crushed shall be regularly sized before passing through each roll, and each roll shall only treat one size of ore.

944 of 1905. STAMP TAPPETS.—F. Anderson and J. S. Jarvis, Johannesburg. Improved method of fixing tappets to stamp stems.

6,931 of 1905. McDOUGALL FURNACE.—F. J. Falding, New York. Improvements in the stirring arms of mechanical roasting furnaces, so as to enable them to be easily replaced, and also with the object of making them more durable by means of internal cooling.

9,199 of 1905. RECOVERY OF IRON FROM SLAG.—O. Thiel, Landstuhl, Germany. An improved furnace and process for recovering iron from slags containing much oxide of iron.

13,061 of 1905. SAFETY-LAMP.—J. Prestwich, Manchester. An improved miners' safety-lamp.

13,351 of 1905. RECOVERY OF NICKEL FROM ITS ORES.—C. Langer, Swansea. Improvements in the process for obtaining nickel from its ores by forming a volatile compound with carbonic oxide, the improvements relating chiefly to the temperature at which the process is conducted.

Week ended Nov 4, 1905.

21,393 of 1904. BRIQUETTING ARSENIOUS ACID.—L. Souheur, Bobrek, Silesia. Method of briquetting arsenious acid by means of heat and pressure, so as to make it more suitable in glass manufacture.

21,816 of 1904. COAL-CUTTING MACHINE.—J. G. Patterson, Manchester. Improved carriage for percussive coal-drills, for use where the roof is low.

25,832 of 1904. REGULATION OF HEAT IN REVERBERATORY FURNACES.—B. E. Eldred, New York. In reverberatory furnaces, regulating the heat by mixing varying quantities of inert gases with the flame.

28,127 of 1904. ELECTROLYTIC PROTECTING-COATING.—F. Uethemann, Dantzig, Germany. Protecting copper, brass, bronze, etc., from the effect of sea-water by electrolytically depositing upon their surfaces a film of oxide of iron.

28,295 of 1904. BLAST-FURNACE GAS SCRUBBER.—J. E. Thornycroft, London. Improved water-sprays for removing dust and tarry matters from blast-furnace and other gases.

2,795 of 1905. STEAM GENERATION FROM SLAG.—G. Mitchell, Los Angeles, Cal. Improvements in the inventor's method of generating steam from hot slag.

11,875 of 1905. BLAST-FURNACE WATER-JACKET.—C. W. Hawkes and F. Klepetko, Great Falls, Mont. Improved form of water-jacket for blast-furnaces.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. John V. N. Dorr, of Terry, S. D., was in Denver recently.

Mr. Ben S. Revett has been in New York city for a few days.

Mr. William Russell has returned to Denver from Sheridan, Montana.

Mr. Dwight E. Woodbridge, of Duluth, is in the Bingham district, Utah.

Mr. Leo Von Rosenberg has removed his office to 42 Broadway, New York.

Mr. J. H. Curle passed through New York this week on his way to London.

Prof. H. A. Wheeler has been to Shullsburg, Wis., in the interest of Chicago parties.

Mr. T. A. Rickard arrived in San Francisco this week, on his return from Mexico.

Mr. Herman A. Keller, representing the Guggenheims, spent a few days in Butte recently.

Mr. E. C. Engelhardt is at present at Elizabethtown, N. M., on professional business.

Mr. F. H. Minard returned to Denver a few days ago from a professional trip to Missouri.

Mr. W. C. Brace, of Denver, is at present engaged in examining properties in Guadalajara, Mexico.

Mr. Albert L. Pearce, a mining engineer of London, spent a few days in Butte recently inspecting mining property.

Mr. E. W. Sebben has completed his trip in Arizona, and is at present doing professional work in Park county, Colorado.

Mr. Arthur Thacher has just returned from a prolonged trip through the Arizona mining camps in the interest of New York parties.

Prof. S. F. Emmons, of the United States Geological Survey, paid a brief visit to the Cactus mine in Beaver county, Utah, recently.

Mr. J. M. Dikeman has returned to Colorado after a three years' engagement with the United Rhodesia Gold Mines Co. in South Africa.

Mr. W. B. Milliken returned from New York to Denver a few days ago, and in a few days will start on a professional trip to Bullfrog, Nevada.

Mr. Edwin L. Dufourcq, of New York city, leaves this week for a professional trip to Peru, South America. He expects to return about Feb. 1.

Mr. A. B. Rogers, a well known mining expert of New York, has been visiting Gilpin, Boulder and other counties in Colorado during this month.

Mr. W. J. Chalmers anounces that he has taken permanent quarters in the Railway Exchange building, corner Michigan avenue and Jackson boulevard, Chicago.

Mr. Robert McF. Doble, consulting engineer, of San Francisco, has severed his connection with the Abner Doble Co., in order to resume his individual practice.

Col. Richard E. Plunkett, of New York, and Judge Cornelius J. Gavin, of New Mexico, have been investigating coal and mineral deposits in Routt county, Colorado.

Mr. G. P. Goodier, of Central City, Col., a well-known mining engineer and promoter, has gone East on a business trip. He expects to be absent about five or six weeks.

Mr. Henry Bahrs, superintendent of the Copper World Extension Mining Co., Okanogan county, Wash., has gone to Columbus, O., to meet the new board of trustees.

Mr. Edmond N. Skinner has returned from Nicaragua, where he has been engaged for over a year examining mining properties. He will return to Denver, Colo., soon.

Mr. Adam Innis, of Columbus, Ohio., secretary of the Copper World Extension Mining Co., is visiting the company's property, at Loomis, Okanogan county, Washington.

Mr. C. H. McMillan, late of Ensley, Ala., has joined the staff of the Dominion Steel Co. He will have charge of the construction and operation of the open-hearth department at Sydney.

Col. Henry M. Pellatt, a leading financial man of Toronto, and interested in many industrial enterprises, has been created a Knight-Batchelor by King Edward and is now Sir Henry Pallatt.

Mr. N. D. Phelps has been appointed sales manager of the mining, crushing and cement machinery department of the Power & Mining Machinery Co., to succeed Mr. T. H. Tracy who has resigned.

Mr. J. R. Woodbridge has been made manager of the Tonopah sampling plant of the Western Ore Purchasing Co. The stock of this company is controlled by the Taylor & Brunton Sampling Company.

Mr. Percy E. Barbour has been in New York for a few days, returning from a two months' professional trip to New Mexico, and *en route* for Boston, where he will made his headquarters for the present.

Messrs. Jas. Gayley, Thos. Morrison, H. Coulby and A. F. Harvey, officials of the United States Steel Corporation and the Pittsburg Steamship Co., have been in Duluth, Minn., and on the Mesabi range recently.

Mr. Joseph Gazzam, manager of the Simmer & Jack gold mine, has returned to South Africa after six months' leave of absence. Mr. Gazzam returns with a St. Louis bride, whom he has known since childhood.

Mr. A. B. Scully, of Chicago, has been making a visit to Breckenridge, Col., as a member of the reorganization committee of the Gold Pan Mining Co. and the Gold Pan Engineering & Mining Supply Co. in Summit county.

Mr. G. R. Payne, of 2317 Ward street, Berkeley, has just returned from his property, the Gold Cord, in Trinity county, and states that the shaft has now reached the 300-ft. level and drifting is being done on a 3-ft. vein of ore.

Mr. Aubrey Spencer, son of J. W. Spencer, of the great boiler-plate and steel manufacturing firm of John Spencer & Sons, Ltd., Newcastle-on-Tyne, England, is making a tour in Canada, visiting the steel plants of the Dominion.

Messrs. J. W. Morgan, W. E. Eshelman and S. S. Gilbert, of Sharon, Pa., Theo. D. Morgan, of Newcastle, Pa., and Charles J. Barrett, of Meadville, Pa., have been visiting the Grand View mine, at Loomis, Okanogan county, Washington.

Mr. Munroe Harman, manager of the Ruby mine, near Nighthawk, Okanogan county, Wash., has gone on a three weeks' trip to Mansfield, O. His business is connected with the estate of the late James W. Hagerty, of Nighthawk, of which he is an executor.

Messrs. J. J. Case, smelter superintendent for the Cerro de Pasco mines, Peru, together with I. J. Shields, E. C. Jacques and others from the Lake Superior region, who will have responsible positions under Mr. Case, have arrived at Cerro de Pasco from this country.

Dr. J. Bonsall Porter, professor of mining engineering at McGill University, Montreal, has returned to that city after a four months' trip abroad, during which he was one of the guests of the British Association on the occasion of the annual meeting in South Africa.

Obituary.

Beauchamp H. Smith, second vice-president of the S. Morgan Smith Co., of York, Pa., died at his home in Los Angeles, Nov. 1, at the age of 36 years. Mr. Smith went to Los Angeles about five years ago for the benefit of his health, since which time he has resided there, and hopes of a complete recovery were entertained.

W. S. Alexander died at Bullfrog, Neva-

da, on Oct. 21, from injuries received in falling from a horse, and was buried with Masonic honors on Oct. 23 in the Beatty cemetery. He went to Bullfrog from Colorado last Christmas, and formed a wide circle of friends, who mourn his death. Mrs. Jennie Alexander, wife of the deceased, lives at Juneau, Alaska. Mr. Alexander was about 52 years of age. His early years were spent in Colorado mining camps, writing for the newspapers of Denver, Leadville and Cripple Creek. He possessed literary ability and was generous, free hearted, and honorable in all his dealings.

After a lingering illness attributable to a long life of hardships and exposure on the desert, Dr. J. P. Garnett died at Bullfrog, Oct. 24, and was buried Wednesday in the Beatty cemetery. Deceased was 66 years of age and without family.

The remains of both Dr. Garnett and W. S. Alexander were laid side by side in the new graveyard south of Beatty. As they knew the mining camp and the hills in life, they were laid to rest amid the scenes they loved so well.

Societies and Technical Schools.

University of Arizona.—The University of Arizona, at Tucson, is entering upon the most successful year in its history in respect to the character and number of students enrolled. That class of energetic young men who find it necessary to spend a part of their time earning the wherewithal to proceed with their college education are finding that the University of Arizona offers advantages for both work and study. The University has the good fortune to still retain a portion of the time of the veteran geologist, Prof. W. P. Blake, and the department has been further strengthened by the appointment of Cyrus F. Tolman, Jr., as professor of geology in charge of the department.

The increasing interest at present displayed in the mining development of the region adjacent to Tucson, has led to an enlargement in the capacity of the commercial assaying department, by the appointment of R. G. Mead, who was formerly connected with the Troy-Manhattan Copper Company as assayer and engineer, as commercial assayer in the Department of Mines and Assaying.

American Society of Mechanical Engineers.—The fifty-second meeting of the American Society of Mechanical Engineers will be held in New York during the first week in December. The headquarters, instead of being at the Society House, 12 West Thirty-first street, as in previous years, will be at the Edison Building, 44 West Twenty-seventh street, the two upper floors being used.

The opening session, at which President John R. Freeman will present the annual address, will be at 44 West Twenty-seventh street on Tuesday evening, Dec. 5. The second or business session will be held Wednesday morning, in the main saloon of the steamship *Amerika, at* the docks of the Hamburg-American Line at Hoboken, N. J. Following this session a special train will take those desiring to make the excursion to the new Henry R. Worthington Hydraulic Works at Harrison, N. J. Wednesday evening there will be an illustrated lecture at 44 West Twenty-seventh street, by Prof. R. W. Wood, of Johns Hopkins University, on "Photography of Invisible Phenomena." The third session will be on Thursday morning, at 44 West Twenty-seventh street, and besides the presentation of professional papers, there will be a discussion on the subject of "Bearings." Thursday afternoon there will be a reception at the New York School of Automobile Engineers. The usual reception at Sherry's will occur on Thursday evening. The closing session will be at 44 West Twenty-seventh street, on Friday morning, and will be devoted to the presentation of professional papers.

Trade Catalogues.

The Brown-Cochran Co., Lorain, O., issues its catalogue of the Brown gas-engine.

The B. F. Sturtevant Co., Hyde Park, Mass., issues its flyer, "Mechanical Draft, what it is; what it does."

The Joshua Hendy Machine Works, San Francisco, Cal., issues catalogue parts in Spanish. They are intended to make up into a complete volume of several pamphlets.

Industrial.

The Massachusetts Steel Casting Co., Everett, Mass,. has rebuilt one of its 15-ton open-hearth furnaces which it put in operation Oct. 21, and is now using its Tropenas converter in connection with the open-hearth furnace for the manufacture of both light and heavy castings.

The Pittsburg office of the Otis Elevator Co. reports an order for a single installation of 44 freight elevators in the new building of the Pittsburg Terminal Warehouse Co., of Pittsburg, Pa. They are to have a lifting capacity of 6,000 lb. and a car travel of about 100 feet.

At the Monongahela blast-furnaces of the National Tube Co., a new viaduct is to be constructed from the Pennsylvania railroad bridge at Riverton directly into the yards in front of the furnaces. This will provide much better facilities for the handling of ore and other materials.

The Wellman-Seaver-Morgan Co., of Cleveland, Ohio, has been awarded the contract for crane service over two shipbuilding berths at the United States Navy Yard at Mare Island, San Francisco. The contract comprises a steel trestle and a high-speed cantilever gantry crane traversing the two berths.

The Pelton Water Wheel Co., of San Francisco, reports closing a contract with the Oro Water, Light & Power Co., of Oroville, Cal. This calls for two 2,000-h.p. Pelton units complete, with Sturgess governors. The machines are to operate under 465 ft. head, and will be direct connected to electric generators. The company also reports orders for Tokio, Japan.

The Crucible Steel Co. has purchased the old Keystone Bridge Co. property in Pittsburg for about $500,000, or less than $1 per square foot. The property comprises a little over 10 acres and belonged to the American Bridge Co., being one of the largest bridge-making plants taken over by the American Bridge Co. when it was formed a few years ago. The buildings are in good condition.

The Dover Pig Iron Co., recently organized, will operate Bear Spring furnace, Tennessee, which will soon be put in blast, having been thoroughly repaired and reconstructed. Dover furnace, which will soon go out of blast for repairs, will probably be operated later. The company will manufacture cold-blast charcoal pig iron; daily capacity 16 tons. J. Ferguson is president; J. H. Lory, vice-president, and J. C. Ralls, secretary-treasurer.

The Republic Iron & Steel Co. is preparing to make some extensive additions and to carry out its policy of centralizing its plants. It is stated that six mills located in Indiana will be dismantled. These include the Central Works at Brazil; Indiana and Muncie mills at Muncie; Terre Haute and Wabash mills at Terre Haute, and the Alexandria plant at Alexandria. These mills are among the oldest in the West; some have been idle for several years and others have been operated irregularly.

The Union Station at the Washington, D. C., terminal of the Pennsylvania Railroad, is to be equipped with four 500-kw. steam turbines built by the Westinghouse Machine Co., of East Pittsburg, Pa. They are to drive alternating-current 60-cycle generators, running at 3,600 r. p. m. Dry saturated steam will be used at 150 lb. pressure and 25 in. vacuum, and the turbines will be capable of developing 670 electrical h.p. each. The A. C. generators will be of the bi-polar rotating-field type, wound for three-phase current at 2,300 volts.

At a meeting of the directors of the Taylor Iron & Steel Co., held in New York, Oct. 31, Lewis H. Taylor resigned as president and was succeeded by Robert E. Jennings, of Jersey City, N. J., who has been vice-president of the company since it was organized in 1891. Percival Chrystie was elected vice-president to succeed Mr. Jennings. Knox Taylor was elected general manager. The officers at present are as follows: President, Robert

E. Jennings; vice - president, Percival Chrystie and Dr. Henry M. Howe; secretary and treasurer, T. F. Budlong; general manager, Knox Taylor. Lewis H. Taylor has been president and director of the Taylor Iron Works and the Taylor Iron & Steel Co. since the former company was organized in May, 1868. For several years he has been anxious to relinquish the presidency, but the directors were unwilling to have him do so until the present time, when Mr. Taylor insisted that his age was such that he should be relieved of all care and anxiety in business matters. In accepting Mr. Tayor's resignation the board unanimously elected him honorary president. Robert E. Jennings has been connected with the Spaulding & Jennings Co., of Jersey City, N. J., later with the Crucible Steel Co. of America, and still later receiver of the Carpenter Steel Co., of Reading, Pa. Upon reorganization of the latter company some months ago, Mr. Jennings was elected its president, which office he now holds. Percival Chrystie has been connected with the Taylor Iron Works and the Taylor Iron & Steel Co. in various capacities since 1887, and Knox Taylor has been with the company for the past four years. Mr. Chrystie and Knox Taylor make the fifth generation of the Taylor family who have been interested in the manufacture of iron and steel in Hunterdon county, New Jersey.

Construction News.

Harlan, Kentucky.—The International Harvester Co., 7 Monroe street, Chicago, Ill., is reported to intend the erection of coke-ovens in this county.

Woodward, Alabama.—The Woodward Iron Co. will enlarge its No. 2 furnace and improve its plant in other ways. J. H. Woodward is president.

Chattanooga, Tennessee.—The Southern Lead Co. will erect a 150-ton ore-smelting furnace and instal machinery for the manufacture of lead pipe.

Three Forks, Colorado.—The Boston-Sierra Madre Mining Co. will put up a concentrating plant. L. A. Pease, Steamboat Springs, Colo., is manager.

Steamboat Springs, Colorado.—The Three Counties Mining & Milling Co. will buy machinery for hydraulicking. C. D. Mansfield, of this place, is president.

Albion, Colorado.—New machinery is to be installed and a mill erected by the Cashier Gold Mine & Milling Co. Thos. L. Wood, Boulder, Colo., is manager.

Trinity County, California.—G.R. Payne, owner of the Gold Cord mine, in this county, intends installing a 10-stamp mill and cyanide plant. Address 2317 Ward St., Berkeley, California.

Sparrows Point, Maryland.—It is announced that the Maryland Steel Co. will spend $250,000 in improving its plant here. The actual work of construction is to be begun early in the spring. F. W. Wood is president.

Hayden, Colorado.—The Weir Coal Co., of Kansas City, Mo., has located 5,000 acres of coal land and will purchase machinery for its development. F. H. Metcalf, of Yampa, Colo., is agent of the company in this State.

Houghton County, Michigan.—Important changes and reconstruction in power and mine plants are under consideration by the Tamarack and Osceola managements. The plan is to introduce electricity extensively in place of steam.

Winston, Montana.—R. E. Bell, owner of the East Pacific mine at this place, will make improvements in his concentrator. It is expected that the new machinery will raise the capacity to 70 tons of of concentrates per day instead of 30, as at present.

East Argentine, Colorado.—Owners of the Domingo mine, in this district, are arranging to instal air-compressor and machine drills, and will probably erect a concentrator in the near future. H. J. Christ, of Georgetown, Colo., is manager.

Georgetown, Colorado.—The Dryden mill site has been purchased by the Waldorf Mining & Milling Co., which intends to instal an electric power plant. The Argentine-Central railroad, it is reported, is also to be electrically equipped. W. J. Wilcox, of this place, is manager.

Sterling, Colorado.—Improvements are to be made in the equipment of the Beaver mine. A compresor, air drills and other tunneling machinery are to be added to the equipment of the Sterling tunnel, owned by the same parties. J. J. Hoban, Idaho Springs, Colo., is manager.

Boulder, Colorado.—A special election is to be held at Boulder, Dec. 19, for approval of voters of the city's contract to purchase Silver Lake for $46,000, also to authorize the Council for an additional bond issue of $75,000, with a view to installing a pipe system for water purposes.

The Red Oak Mining Co. plans heavy development on the Sunburst and Sceptre tunnel properties; a tramway is to be built from the Sceptre tunnel, for handling the ores to the mill and also to the railroad switch. Manager A. B. Montgomery says that the directors are considering the advisability of building a mill at this place to handle their increasing production.

Eldorado Springs, Colorado.—The Eldorado Springs Railway Co. has filed articles of incorporation, capital stock $25,000, and it is reported that the Denver people behind the company will build a cog road, 1½ miles long from the Denver, Northwestern & Pacific railway to Moffat Lakes, as well as a broad-gauge traction road to the Colorado & Southern road, connecting their resort in Boulder county. The company will have offices in Denver and Moffat Lakes, Colorado.

Special Correspondence.

New York. Nov. 10.

The mining industry throughout the country shows marked activity; every district is either developing new ore, installing new plants, or is working its present facilities to their utmost limit.

In California, prospecting is being carried on energetically in the Panamint range and in Death Valley. Two new companies have been organized to mine for quicksilver, and two parties are prospecting for diamonds. A new feature in another section of the State will be the attempt to work the auriferous gravels along the Stanislaus river by hydraulic elevators, previous attempts to work the same gravels by the ordinary dredging methods having failed.

An encouraging feature in Alaska is the projection of a railroad to reach the copper districts on Copper river, with the idea of extending it ultimately to Eagle City on the Yukon and within easy reach of Dawson.

In Arizona, development of new districts is going on with rapidity, and in the old districts further exploration has succeeded in finding large bodies of high-grade ore. Several new furnaces are in course of erection; that of the Arizona Smelting Co. has just started.

Mining in Colorado is to be stimulated by the building of several railroads and the completion of another into mineral-bearing country; North Park will be especially benefited. The output of Leadville is growing steadily under the influence of an increased demand for iron and zinc ores, and many old mines are being reopened. Several new strikes have been made both in the down-town district and on Breese hill. Carbonate Hill continues to be a large and steady producer.

The output of the Butte district of Montana is to be enlarged by the operations of the Pittsburg & Montana Copper Co., which has just started its furnaces and has shipped its first 100-ton lot of blister copper. A new enterprise is the East Butte Co., which has recently been organized; it has bought several mines to the east of the town and is looking for more.

Salt Lake City is destined to be one of the leading smelting centers in this country. The American Smelting & Refining Co. is pushing work on its new smelter at Garfield Beach. It is expected to go into operation in the spring of 1906, and in its finished condition will have a capacity of 5,000 tons of ore a day. Construction is of the most durable kind, and special precautions will be taken to prevent contamination of the atmosphere by fumes. Its plant will include two thoroughly equipped sampling mills. The financial difficulties of the Utah Copper Co. are overcome, and construction of the company's mill, designed to concentrate

the low-grade porphyry of Bingham, will proceed at once. Progress has already been made with the foundation. The plant will have a capacity of 2,500 tons. Other companies are exploring this same porphyry, and it may be looked to as a probable source of a large output. The Ontario, at Park City, is struggling to clear its drainage tunnel from the caves that occurred there last spring; they have not yet succeeded, and the mine is flooded, although Daly West and other mines are not affected. Alta is to have railroad facilities; part of the old track is to be equipped with electric power. Two new railroad projects will have a big influence on Utah mining. The Burlington road plans to build west from Gurnsey, Wyo., to Salt Lake City, crossing an area noted for its wealth in coal and oil; the Western Pacific railroad is pushing ahead, and has already reached the Utah-Nevada boundary, where mineral wealth has long been known.

Conditions at the Cœur d'Alene were never better. Bodies of high-grade ore have been discovered, and a large force of men is at work in all the principal mines. The output for this year will undoubtedly exceed all previous records.

The importance of southern Nevada is growing with the advent of railroad facilities. The first shipment of ore by train has recently been made. The American Smelting & Refining Co., which treats most of this ore at its smelters in Salt Lake, has been obliged to put an embargo on shipments of Tonopah and Goldfield ore, not so much on account of being overwhelmed as because of the necessity of obtaining limestone flux in order to smelt the highly silicious Nevada ores. The company is expected to increase its facilities, and will be able to accept Nevada ores within three months.

Zinc mining in the Platteville district of Wisconsin is proving most profitable. Several companies have been enabled to declare their first dividends as a result of the successful application of magnetic separation. Exploration and development are progressing rapidly, new companies are organized in quick succession and numerous concentrators are projected.

The copper district of Michigan is benefiting by the recently adopted practice of the Calumet & Hecla Co. in taking up outlying territory and developing it. The Superior Copper Co.'s property, to the south of Portage lake, is its latest acquisition. The September output of the district was 19,250,000 lb. copper, the highest monthly figure ever recorded. A great working force is employed, and more skilled miners are needed in the development of several old mines newly reopened.

Mining in the iron ranges of Minnesota is about ended for the season. Many old mines have been reopened and several new ones have just reached the stage of production. The Chicago, Milwaukee & St. Paul is building new ore docks at Duluth, and the Duluth & Iron Range is building new docks also; additional rolling stock is ordered for the United States Steel Corporation's roads.

The most pressing feature in the coal region is shortage of cars. This affects transportation in all directions, but particularly over all-rail routes. Several important commercial changes have occurred, that of chief interest being that Coxe Bros. & Co. have sold out to the Lehigh Valley, and the Schuylkill Coal & Iron Co. has bought land in Branch township. Several attempts are being instituted to work thin seams which were abandoned many years ago. The mine inspection districts in the anthracite fields have been increased in number from 15 to 20 and have been re-arranged. Two huge anthracite breakers have been started recently—the Lackawanna's Truesdale and the Lehigh's Black Diamond.

In the bituminous fields of the central States, a consolidation of several important companies has been effected, under the title of the Ogara Coal Co. A group of coal dealers in Detroit has also bought coal lands in the Pocahontas field.

San Francisco. Nov. 8.

After making a sort of investigation into the charges against certain of their "watchmen"—called "spies" in the mountain region—the Anti-Débris Association adopted a resolution to the effect that the charges should be investigated in a criminal court; and that if any person who knew the facts would swear to a complaint the association would "assist in the prosecution." Captain W. H. Harts, secretary of the California Débris Commission (a Federal body) filed the charges, having secured the necessary affidavits from the hydraulic miners who were "approached" by the watchmen of the Anti-Débris Association, offering to protect them from injunction for a $500 fee. Captain Harts, however, positively declines to give the names of his informants unless assured the watchmen will be prosecuted by the association which employed them, or by some other association or individual. He declares that, failing a prosecution by others he will himself, officially, push the charges not only against the two men referred to, but against several of their predecessors who have solicited or accepted bribes from hydraulic miners. In answer to a question propounded by the attorney of the Anti-Débris Association, Captain Harts stated that information had been frequently given to him obtained from watchmen of the association, showing that persons who had permits from the commission had erected appliances so as to allow their débris to escape into the river, and that in such cases the licenses had been revoked; also in some instances reports had been made of persons who were mining illegally without any permits whatsoever. He stated that hydraulic mining at present was under very good control, and that the rivers were clearer than they had been before, but that if the vigilance exercised by the Anti-Débris Association or by the Federal officers was relaxed, illicit hydraulic mining would again be resumed. He thought, however, that where a person was caught in illegal hydraulic mining, or his dam was insufficient, a report should be made to his Commission, so that it might take action in the premises, although he admitted that such action might necessarily be slow and some time would have to elapse before any definite action would be taken.

It may be stated that this matter was originally brought to the attention of the California Miner's Association by Capt. Harts and a committee was appointed to look into it. It was finally thought, however, that the subject was one for the Anti-Débris Association to take up rather than the Miner's Association. The men accused were employed by the former body, which should be the active factor in investigaing their conduct. It is not a miner's fight at this juncture. There is no doubt, however, that this species of blackmail on the miners has been going on a long time, but it has taken an energetic man like Capt. Harts to bring the subject to public notice, and take steps toward the prosecution of the blackmailers.

The new Omega débris impounding dam in Nevada county, supposed to be the strongest ever built by hydraulic miners, has been completed. The dam is located in Scotchman's creek, which has received the tailings from the Omega and other mines for the past 40 years, and in it are millions of cubic yards of gravel. The present company, which has bought out the old company, was compelled to impound this débris before it could gain storage for its own operations. The dam is constructed at a narrow gorge, the walls of the gorge being perpendicular and of hard metamorphic slate. Above the dam the site opens out into a valley, but with a very limited watershed—not over five square miles. The dam is securely anchored to the bedrock both on the bottom and sides. It is 55 ft. long, 30 ft. wide on the bottom, 15 ft. wide on top and 54 ft. high. It is built of concrete, made of well-washed gravel, using one barrel of cement to the cubic yard. Large stones were imbedded in the concrete to gain additional strength. Altogether 1,750 cu. yd. of masonry went into the dam, which cost about $13,000. The California Débris Commission has granted permission for the building of a crib dam on top of the concrete one, making the total height 80 ft., which will make a lake at the dam with 50 ft. of water for a settling basin. The gravel and fine débris from the mine may thus be impounded for years to come.

The fire at the Lightner mine, Angels, mentioned in last week's letter, destroyed

not only the surface buildings and hoist, but also the 40-stamp mill. Only one-fifth of the loss of $100,000 was covered by insurance. A reserve fund of some $20,000 has always been kept on hand by the directors, and this will now be used for rebuilding. The work of constructing new buildings has already commenced. Some of the heavier machinery was not totally ruined, and may be used in re-building the mill. It is expected that everything will be in working order again within 60 days. Sixteen miners were underground when the fire broke out, and as the hoisting works were attacked before the alarm reached the underground men they sought safety through the 600-ft. level, where a connection has been made with James V. Coleman's Angels mine on the north. Through that shaft the men came to the surface without injury. This safety connection was made some time ago in anticipation of just such danger as was found in this fire, and the precaution was a fortunate one.

Oroville, Butte county, where the largest number of the dredges of the State are at work, is again excited over the question of the dredge men actually mining the town site. There is little danger of this, however, as most of the dredge-owners are willing to have the town incorporated, which would put a stop to any such intention. W. P. Hammon, the principal dredge-owner, has lately purchased large property interests in the town, in view of its coming importance in connection with the building of the Western Pacific railroad. The supervisors have all declared that no dredge will ever be permitted to cross a street, so that the town limits can no further be encroached upon for mining purposes.

Two men who own 5,400 shares of the Great Western Gold Co., incorporated in Arizona, and owning the Afterthought copper mine in Shasta county, California, have filed a suit at Phœnix, Arizona, alleging insolvency of the company and asking the appointment of a receiver and other remedies.

The Desert Mining Co. has commenced an action in the Superior court against Henry Parker, J. Goldsworthy, J. Ashton, Thomas Wally and F. M. Tait to quiet title to the Desert mine, and to restrain the defendants from extracting any ore from the mine pending the final determination of this action. The mine is located in the Mojave mining district, Kern county.

C. P. V. Watson has commenced action in the Superior court against the Minnehaha Mining & Milling Co. to foreclose a mortgage for $7,500. The property involved is in the Amaline mining district, Kern county.

The troubles of the old Yuba mine at Maybert, Nevada county, have been made public by a suit commenced against the stockholders of El Oro Mining Co. for $3,566, goods delivered. El Oro Co. operated the mine until the funds were exhausted. Each of the 24 stockholders is made a defendant, and the plaintiffs hope to compel them to pay their share of the liability.

The old Nevada County Miners' Association, which has not met since 1902, is being revived, in view of the coming convention of the California Miners' Association in that county. The Nevada County Association was a branch of the parent organization, but the members became "disgruntled" because they thought themselves overlooked in the distribution of offices and therefore as a body practically withdrew support from the State association. Now, however, the county has come back into the fold, and the probability is that a Nevada county man will be elected president of the State Association at the coming annual convention. If this is the case, and it is pretty sure to be, then the secretary will also come from that county, which would make the headquarters at Nevada City or Grass Valley, instead of in San Francisco, as heretofore. This will gradually shift the responsibility of the management and conduct of the association from the metropolis to the interior mining regions, as should be the case. Whether, however, the mining counties will financially support the association properly remains to be seen. The bulk of the support in the past has come from San Francisco—the merchants, manufacturers and machinery men—and they will be very glad to see the miners themselves run the organization in their own way and with their own funds.

Spokane. Nov. 8.

The Buster mine, at Elk City, Idaho, owned by "Buster" Smith, has been sold to San Francisco people. Thirty-two men have been put to work. The price is reported to be $100,000. A Mr. Ellis of San Francisco is one of the buyers, and he is reputed to be backed by Britishers. The vein runs from 12 to 20 ft. wide, and the values from $14 to $40 a ton in gold. About half can be amalgamated and the rest chlorinated.

A. D. Coplen, of Spokane, has bonded the Ruth group, at Mullan, Idaho, from Hans J. Rice, of Wallace, Idaho, for $50,000. The Ruth is an extension of the You Like, recently purchased with the Morning group by the Federal Mining & Smelting Co. from Larson & Greenough. The acquisition of the Morning by the Federal considerably strengthens the position of that corporation, formed to control the lead mines of the northwest. The Federal now owns the Morning, the Standard, the Mammoth, the Tiger-Popman, and the Last-Chance-Skookum group at Wardner, Idaho. The Guggenheim interests, which are now dominant in Federal, have also a considerable slice in the Bunker Hill & Sullivan at Wardner. The remaining interests in the Bunker Hill, and the Hercules mine itself, are the only big producing elements in the Cœur d'Alenes, not dominated by these interests.

The White Cross Mining Co., of Moscow, Idaho, is advertising for bids for continuing the lower tunnel 100 ft. It is expected that this will tap the main ledge 400 ft. below the surface. Plans are being made for treating the ore by some new process.

The first zinc shipments ever made from the Cœur d'Alenes have been sent out from the Success mill to the Iola, Kan., smelter. There were about 40 tons of concentrates. The Success mill is being operated continuously. By jigs and tables lead and zinc are being concentrated separately. H. F. Samuels, prosecuting attorney of Shoshone county during the riots of 1899, is manager of the Success. A number of Oakesdale, Wash., people are heavily interested.

Moscow, Idaho, is excited by a discovery of free gold on a farm which has been tilled for 20 years. Enthusiastic farmers started to make mining locations even on properties owned by them in fee.

The Diamond Drill Contracting Co., of Spokane, is driving diamond drill holes on the War Eagle and Centre Star mines at Rossland, B. C.; the Sullivan group at Marysville, B. C.; the Nickel Plate at Hedley, B. C.; the B. C. Copper Co. at Princeton, B. C.; John F. Cook's property at Kendall, Mont.; the North Mocassin at Kendall, Mont.; and the Bullard at Kendall, Montana.

Leadville. Nov. 8.

As the year draws to a close the monthly output steadily increases, and the total tonnage for the month of October was close to 81,000 tons, the zinc shipments amounting to about 20,000 tons. The increase from the mines and the bright outlook for the future have induced the American Smelting & Refining Co. to build two new furnaces at the Arkansas Valley plant, which, when completed, will give the plant 11 blast-furnaces.

Renewed activity is noticeable at Fryer hill, and the old-time bonanza producer has taken a new lease of life and is producing more ore at present than it has for years. The reason for this is the great and growing demand for iron at the different smelters in the State. From the 80-ft. level of the Chrysolite a body of ore was recently opened, and the lessees are shipping a carload daily, and as the ground is opened this will be doubled. From the New Discovery, of the Little Chief property, a set of lessees are shipping a fair tonnage of iron that nets them $3 per ton; at the McCrea shaft, of the Little Pittsburg, 20 tons daily are going out. At the Healy shaft, at a depth of 135 ft., a good body of ore has been encountered, and shipments will start this week. From the 265-ft. level, of the

Matchless, about 10 tons daily of silicious ore, running from 14 to 35 oz. silver per ton, with a trace of lead, are being hoisted. Dunkin No. 1 shaft has resumed operations and is shipping a good grade of iron. The properties controlled by the Fryer Hill Mines Co. are outputting in the neighborhood of 150 tons daily of iron and silicious ores.

Shipments are on the increase from the different claims on Breece hill, and the Highland Chief, after doing considerable repair work, is now in a position to ship a heavy tonnage daily; in addition to the ore that will be shipped, prospecting in virgin ground will be carried on from the 250-ft. level. Lessees on the Golden Eagle, near the Little Jonny, are shipping daily three carloads of a fair grade of silicious ore from the 400-ft. level. At the Ollie Reed, all of the work has been abandoned at No. 2 shaft, and in the future the energy of the company will be devoted to No. 1 shaft, where there is a good body of ore. The results of the diamond-drill work at No. 1 shaft were not satisfactory. Sinking on the Silver Nugget has commenced, and the first lift will be 700 ft. Two shafts are working on the Forest City, and ore is being shipped from both.

Two sets of lessees are working on the Adelaide, at Adelaide park, and both are shipping a good tonnage of excellent ore; from the north side a body of ore was encountered during the week that is 40 ft. wide, and the lessees state that it will average $30 per ton, and the work of opening the shoot is being pushed. The Hub is shipping 30 tons daily, and from the old Park shaft fully 75 tons of good iron is being sent out.

The Mosquito group of claims, Mosquito range, is stacking ore on the dump that runs high in gold, and when the roads open again in the spring the ore will be shipped; the claims are at the edge of timber line. The New York and the Moffat tunnels are being driven ahead and are now in close to 1,000 ft.; work will be continued all winter.

The Ida May shaft, Lake Park creek, was recently sunk to a depth of 60 ft. when a small streak of ore was encountered; it was decided to drive a drift into the hill from the bottom of the shaft. This was done, with the result that the vein has widened out to several feet and carries values in gold-silver amounting to $20 per ton.

Some necessary repair work has recently been carried on at the Winnie shaft, Big Evans, and it was completed a few days ago, when the company put on an extra force of men breaking ore; the property is now shipping 150 tons daily of sulphides and oxide ores. From the other shafts of the New Monarch holdings about 200 tons daily are being sent to the smelter at Salida. The Fortune is now shipping 75 tons daily of a fair grade of oxide and silicious ores from the upper workings, and it is probable that within another month work will be commenced at the lower workings.

The Wilkesbarre, St. Kevin district, last week shipped 30 tons of high-grade ore to the local smelter, and the returns were very satisfactory; work will continue all winter on the claim.

Denver. Nov. 8.

The Cripple Creek statement that the Dorcas mill at Florence, which is the most successful cyanide plant in Colorado, has been purchased by Stratton's Independence Co., was premature, as the deal has not been consummated yet.

The Elkton Co. is receiving royalties from the lessees, exceeding $20,000 per month, and the management is pushing development work in several parts of the property.

The Rico-Aspen group of mines, near Rico, is being worked again, and under the present management the properties will be developed in a thorough manner. William Wittle is manager, Max Buehmer consulting engineer, and the concentrating plant will be thoroughly overhauled under the direction of Franz Cazin, of this city.

During the month of October there was deposited at our branch mint gold bullion to the value of $2,098,787, making the total for the current year thus far $22,943,311. Some time next month the coinage of subsidiary silver will commence, and that of gold will start in January, 1906; the machinery is being set up at last.

Within a few days, the suit of the United States reclamation service against the Moffat road for possession of Gore cañon will be tried in the Federal court before Judge Hallett. It is stated that the engineers of the service have drilled to a depth of more than 100 ft. at the site of the proposed dam without striking bedrock, so that the cost of the reservoir will be enormous if it is ever constructed.

The difficulties between the owners of the Gold King and the miners, in the San Juan country, have been settled, largely through the influence of State commissioner of labor, E. N. Brake.

News has been received here of another murder in Mexico, that of John O'Dea, a mining engineer, who was killed by his Mexican guide while on his way from Hermosillo, Sonora, to some mining properties in the interior. His body was found by some travelers and taken to Hermosillo.

Another industry, which in due time will probably become an important one, will start up in a couple of weeks. The Western Iron Mills Co., under the direction of the Cary Brothers, formerly of the Mine & Smelter Supply Co., has very nearly completed a plant on the Colorado & Southern tracks, a short distance from Burnham, where it will manufacture bar steel, iron and rails. About 100 men will be employed, and Warren C. Bogue will be manager.

The Pandora Gold Mining & Development Co., which recently secured a lease on the Smuggler-Union mines, at Telluride, expects to do a great deal of development work in their territory.

President Hearne's annual report of the Colorado Fuel & Iron Co.'s business during the year ending June 30, 1905, which has just been published, is certainly very creditable to his management. In the fuel department alone there was an increase of gross earnings of $5,618,161, while the gross earnings of the iron department increased nearly $4,000,000.

Judge Riner, in the United States Court, has handed down his decision that ex-Governor Peabody, Sherman Bell and Bulkeley Wells must answer to the complaint of Charles H. Moyer, president of the Western Federation of Miners, in which the latter sues each of them for $100,000 damages because of his imprisonment by the Colorado National Guard during the labor troubles last year. The attorneys for the State officials made a motion to dismiss the complaint, which the Court overruled, giving 10 days during which to file an answer. The outcome of this case is looked forward to with a great deal of interest.

The annual convention of the third Colorado district of the Western Federation of Miners is at present in session in Silverton; it includes Gunnison, Mineral, San Miguel, San Juan, Ouray, Hinsdale, Dolores and La Plata counties.

In the district court at Colorado Springs, proceedings have been commenced in behalf of about 75 mine owners against S. A. Phipps, treasurer of Teller county, to prevent his selling mining property for delinquent taxes. The complaint is based on alleged exorbitant taxes assessed against the same. On Nov. 13 they will apply for a writ of injunction.

At Adobe, a short distance west of Florence, work has been commenced this week on the Colorado Fuel & Iron Co.'s new canal from that point on the Arkansas river to the steel works at Pueblo, about 35 miles distant.

The purchase of the Dorcas cyanide plant at Florence by Stratton's Independence Co. has not yet been made, but the deal is pending. The company is considering the adoption of the Cassell process for handling part of their ores. A. Chester Beatty having resigned as consulting engineer, George E. Schroeder was appointed in his place.

Butte. Nov. 7.

All of the large copper mines of Butte are being worked full blast, but Boston & Montana is still having trouble in getting its output to the smelter on account of a shortage of railroad cars. Were it not

for this trouble its production of copper this year would exceed that of any year of its existence. All of the companies, with the exception of the Pittsburg & Montana Copper, are having trouble with their ropemen, but it is thought there will be no particular interference with operations. Last week the ropemen, about 80 in all, struck for an increase in wages from $3.50 to $4 a day, and the companies let them strike. They are still out, the companies having refused to comply with their demand. So far no inconvenience of a serious nature has occurred to the companies on account of the action of the strikers. The latter have tried to inaugurate a sympathetic strike of smeltermen, but have so far failed. Manager Wethey, of the Clark properties, has informed the smeltermen that if they strike he will close down the Original Co. plant and ship the output of the mines to the Washoe smelter. The Amalgamated refuses to recognize the Ropemen's Union. Its manager says the company is prepared to meet any trouble.

Pittsburg & Montana Copper shipped 104 tons of blister copper to the Nichols Chemical Co., of New York, last Thursday, and will send out one carload a week hereafter, each car contining 37 tons. The shipment last week contained 190 oz. of silver and 3½ oz. of gold per ton, making it valued at nearly $50,000, the copper being a little better than 99% fine. The company is increasing its output of ore, the extraction being sufficient to keep the blast-furnace and converter in continuous operation. The openings in the veins are heading west, toward the property of the Butte & Boston and Boston & Montana, and are looking fine.

La France Copper, a branch of the United Copper, is extracting about 60 tons of ore per day from the Lexington mine, but has not yet begun pumping water from the lower levels. Its pumps have not arrived, but are due. The shaft on the Lexington is 1,500 ft. deep and there are miles of openings to be unwatered. A portion of the Alice mine workings will have to be drained, as there is a crosscut extending from the 600 of the Lexington to the 700 of the Alice, the collar of the shaft of the latter being 100 ft. higher than that of the Lexington. This crosscut is more than half a mile long.

Raven has struck a shoot of high-grade copper ore in the east level of the 1,200 and is drifting on it. The rock is full of bornite and peacock. Shipments have been suspended for the present, for it is the desire of the company to open its veins in good shape before sending out any more.

Reins Copper has its shaft down 960 ft. and is sinking at the rate of 15 ft. a week. It will go to the 1,200 before crosscutting the veins.

North Butte is maintaining its output of between 500 and 600 tons of ore a day and is pushing the re-timbering of its shaft. It is also preparing for the reception of its new Nordberg hoisting engine, which is due the first of the month. When its improvements are finished it will be in shape to mine almost as much ore as United Copper. The latter company is not getting much ore from its Belmont mine at present, but its Rarus, Cora and Minnie Healey are yielding well.

Montana Zinc is shipping a carload of concentrates each alternate day. The plant is being operated steadily on ore from the Lexington and other mines, the ores of which carry considerable zinc.

Salt Lake City. Nov. 3.

For nearly five years the Wabash mining Co., operating at Park City, has been conducting a quiet, but vigorous campaign of development. President and Manager, N. Treweek, now promises shareholders that the property is about ready to enter the production stage. At the annual meeting the old board of directors was chosen and in his report, covering the operations of the company from Sept. 1, 1903, to Oct. 1, 1905, President Treweek stated that the company had acquired by bonds and leases upward of 185 acres of additional territory, so that it now controls 220 acres. The purchases mentioned have been made at an aggregate cost of $82,000, upon which $11,000 has been paid.

In the development of the property, President Treweek says, five different veins have been found and three of them show considerable ore, and adds: "For 14 months prior to July 1, 1905, our time and energies were devoted to the running of a long line of crosscut work in a general southeast direction; this new line is over 3,000 ft. in length. Since July 1, 1905, we have directed our work to the development of two of the most promising veins; the ore so far found in these veins is high grade, running all the way from 50 to 550 oz. in silver, 20 to 50% lead and from $1.60 to $15 in gold to the ton. These veins are showing great strength as they are explored."

Up to Sept. 1, 1903, there had been shafts sunk and drifts run approximating 5,597 ft. at a cost of $83,755. Since that time, 6,059 ft. have been run at a total cost of $107,041. The officers of the Wabash company are: N. Treweek, Salt Lake, president and general manager; John R. Barnes, Kaysville, Utah, vice-president; W. Mont Ferry, Salt Lake, secretary and treasurer; J. M. Daugherty, Omaha, and Wm. Hatfield, Salt Lake, completing the board.

The mines of the White Knob Copper Co., at Mackay, Idaho, have been leased to the MacBeth Leasing Co., of which Ravenel MacBeth, of Salt Lake, is manager. The smelter, with which the property is equipped, will be operated.

About 75 miles of the Western Pacific, the new railroad from Salt Lake to San Francisco, is graded west of Garfield beach at the south end of Great Salt Lake. The construction of the new road is creating lively interest in the undeveloped districts of western Utah and in Nevada.

Conditions at the Consolidated Mercur mines, at Mercur, are in better shape than they have been in a long time. During the past year an extensive development campaign has been carried on, with the result that the ore reserves have been increased.

President Seymour W. Tulloch, of the Sevier Consolidated Mining Co., operating in the Gold Mountain district, has announced the acquisition for that corporation of the Humming Bird, B. & B., I. X. L., Laura and Noble Grand groups, consisting of 30 lode mining claims, thus increasing the company's domains to more than 1,000 acres. The new mill, now being built, will be ready for commission soon after Jan. 1, 1906, and the initial unit will handle 100 tons of ore per day. A new compressor, also an electric power plant are being installed.

Some quite important developments have been made during the past week on the 1,500 level of the Lower Mammoth mine in the Tintic district. High-grade shipping ore has been encountered.

The coke famine, a legacy of the late fire at the Sunnyside coal mines, is still threatening to the Salt Lake valley smelters. Unless the railroads succeed in landing a supply at the plants within the next few days, it seems almost certain that some of them at least will be forced to close down. The situation is anything but encouraging at this writing.

The ore and bullion settlements covering the month of September aggregated $2,036,550 in all.

Duluth. Nov. 11.

The proposed ore dock of the Duluth, Missabe & Northern road is not yet out of designers' hands, but it is known that it is to be the largest ore dock ever built, with capacity for 90,000 gross tons in 384 pockets. It will be 2,334 ft. long, exclusive of approaches and will cost about $1,000,000. In its construction 12,000,000 ft. of timber will be used and some 9,000 piles will be in the foundation. More iron will be used in this dock, for strengthening, than has ever been put in a pier of the kind. It will be 42 ft. high to the base of the pockets, which is higher than any others, and will be 72 ft. high altogether. This dock will be ready for use some time early in the summer of 1906. It will give the road capacity for the storage of 300,000 tons of ore. Its nearest competitor has about 175,000 tons storage. This road has increased its order for steel hopper-bottom cars for 1906 from 750 to 1,000, and will then have an equipment of 3,200 steel 50-ton and 1,800 wood 35-ton cars. All its main line from mines to dock is now double-track, with the exception of

18 miles of a long tangent through a level swamp. Authority has just been given the road to double this, and the work will be carried on during the winter. Its new Western Mesabi line is expected to be ready early next summer, and will be, if no accidents occur to hinder. This line is 55 miles long, besides branches, and includes some heavy construction. It leaves the main line at Alborn station and strikes as directly as possible northwest for the new town of Bovey. From there branches will reach various mines. It has been hoped that 1,000,000 tons of ore might be shipped over this line in 1906, but there is now little prospect for this.

The road has built large shops at Duluth, and has just let contracts that will nearly double them. These shops are fitted for the repair and reconstruction of steel cars and their tool equipment is therefore very different from what is usual in car shops. A large storehouse for locomotives is included in these buildings, in which engines, after repairs, can be stored during the winter or when not in use.

With these improvements completed, the road can easily move during the ordinary season of navigation upward of 10,000,000 gross tons of ore, and the money now being spent to reach this possibility amounts to more than $4,250,000. The road belongs to the United States Steel Corporation, and most of the ore it hauls is for the furnaces of that company.

The Zenith Furnace Co., of Duluth, is building a thawing-room for ore during the winter. It is connected with the stock-house and is a large enclosed structure into which ore-laden cars will be received during cold weather on their arrival from the mines. Instead of the usual steaming device for thawing ore, there will be a fan to blow dry heated air to and through the cars. Ore will thus be somewhat dried, and the heat will remain better than if from steam. The Furnace Co. is now adding 300 ft. to its coal dock, and may add 500 more.

Mine reports of Iron county, in which are the mines of Crystal Falls, Mansfield, Amasa and Stambaugh, show that there were employed during the year an average of 1,410 men, in 23 mines, and there were 16 fatal accidents, or 11.25 to each 1,000 men employed, a far greater average than in any of the other counties. This disproportion has always existed, on what account I do not know, unless it be that the mines are smaller and therefore proportionately more men are in the dangerous places. The chief employer of mine labor in the county is the firm of Corrigan, McKinney & Co., with 670 men, but their proportion of fatalities was less than that of some of the smaller companies. The Oliver Iron Mining Co. is second in the number of men employed, with 280 men.

Nearly 200,000 tons have been shipped from the old Soudan mine, on the Vermilion range, and this has had some effect in stimulating exploration in the district. Not only have these mines made good shipments, but their shafts are to be deepened and new orebodies to be opened. No. 8 shaft, now 1,300 ft. deep, is to be sunk to 1,500 ft. this winter, to reach an orebody found some years ago by drills. No. 12 shaft, which has been abandoned for some years, is to be reopened and equipped, and it may be that the Lee portion of the mine may be opened and developed.

Indianapolis. Nov. 12.

The shortage of cars in the block coalfield is beginning to prove a very serious matter. The miners, who usually work full time at this season of the year, are now getting but little better than half time. However, they are not viewing the matter in as discouraging a manner as would be expected, as it is proof to them, they say, that there will be no attempt on the part of the operators to reduce the wage scale in the coal producing States. If this were the intention of the operators, they contend, every mine would be working and all the coal possible would be stored by the railways and other companies. The miners of the block-coal district believe the meeting in January to discuss the wage scale, will be productive of little or no trouble. They expect the usual amount of quibbling over minor points, but are confident that the wage scale which has prevailed for the last two years will continue under the new contract.

There is a new kind of trouble in the Indiana mining field, but it is one to which the operators are not a party. The Eighth district is confined to the block-coal mines, about all of which are in Clay county. Some of the members of the organization of United Mine Workers of the district are working in bituminous mines in the Eleventh district, which includes all the other mines in the State, and the charge is made that while they earn their wages in the Eleventh district they are buying coal for their home use from mines in the Eighth district. The charge is being investigated by members of the executive boards of the two districts.

The Indiana miners held a big mass meeting at Linton, Nov. 4, and were addressed by John Mitchell. The meeting was proceded by a parade and the crowd was estimated at 8,000. There was no special occasion for this meeting; it was simply the fulfilment of a long promise by Mitchell to meet with and address the Indiana miners. It was not to promote the organization of the men digging coal, for every man in the coal mines of Indiana already belongs to the United Mine Workers. It is said that no other State is so thoroughly organized. Mr. Mitchell in his address assured the miners that under no circumstances would he agree to the slightest decrease in the wage scale now in vogue. This pledge and declaration was satisfactory to the large number of miners present.

The prices of coal at the Indiana mines was increased 15c. on Nov. 1. This is the second increase since Aug. 1, making 55c. in all. This makes the price higher than for the same period last year.

Platteville, Wis. Nov. 9.

Mining men that have been watching to a greater or less extent the experiments that have been carried on, in this district, in connection with magnetic separation of pyritic ores. There are now 13 roasting and magnetic separating plants in the district, 11 of which are of the galena type, cylindrical pattern, employing the slow roast, which seems best adapted to the pyritic ores of the district. The other two roasters are of different types, employing the quick roast; one of them has proven to be a failure mechanically, as well as commercially. It has been in operation at the Tripoli mine, located in the Mineral Point camp. The owners let a contract for a Galena pattern roaster the early part of the week, contractors agreeing to have same installed and running within 30 days.

One of the largest deals of interest in the district was consummated at the Galena camp recently. 240 acres of mineral land were purchased by Minneapolis capitalists, the consideration being in the neighborhood of $25,000. The new owners intend to begin prospecting at once. Several companies have registered.

The organization of new companies continues daily. Among them is the Prosperity Mining Co., with J. T. Wilkinson, H. C. Hinners and W. M. Hetherington as directors. This company has control of the Carson-Hinners property, in the western part of the Platteville camp. As soon as a driller can be obtained the prospecting work will begin.

The Empire Mining Co. has paid another $10 dividend on each share, making the third during the month of October.

The country between Montfort and Highland camps, locally known as the Centerville diggings, in Iowa county, is attracting considerable attention. Some of the mines in this camp have been worked since the early 30's in a primitive manner. Some prospectors, while working in one of the old shafts recently, opened up a rich vein of lead and zinc ore. As the work of development is carried on, other veins are coming in, and the camp bids fair to take its place among the best in the district. The property in the Centerville camp has never been worked below the water level, and it is hard to estimate what the outcome will be as soon as sufficient pumps are installed to unwater the different mines in the locality. There are acres and acres covered with ore-dumps, which have only been hand-picked, and it is thought that

they will pay handsomely when worked over a modern concentrating plant. Several Eastern capitalists are now negotiating for leases, and it is safe to say that by next spring another large producing camp will be added to the list.

It is expected that the compressor plant at the Brown & Croft mine, in the Shullsburg camp, will be started about Dec. 1. Work on the concentrating plant and magnetic separator will be pushed so as to have them completed by February The orebody at the B & C is reported as rich. Messrs. Phil Allen, Jr., and W. A. Jones, of the Mineral Point Zinc Co., are the principal owners.

The Empire Mining Co. has concluded to instal a roaster and magnetic separator. Work will be begun on the foundations at once. The company has quantities of pyritic ore suitable for treatment.

A number of mining men who have been operating in the Western goldfields are paying considerable attention to the Platteville zinc and lead district, being attracted by the large returns from a comparatively small investment. The majority of the paying propositions represent an average investment of $30,000 to $40,000. Messrs. Rogers & MacKay, of Pittsburg, Pa., have secured several hundred acres of promising mining land in the vicinity of the Linden camp.

Scranton. Nov. 13.

With the issue of the call for the Mine Workers' joint convention to be held in Shamokin on Dec. 14, is sounded the first note of the battle of negotiations between the operators and the miners of the anthracite region. The call was issued a few days ago from this city, and states that the object of the convention will be "to consider and take action concerning conditions of employment to become effective after March 31, 1906." A significant recommendation is made in the call, as follows: "The following resolution was adopted by a joint meeting of the executive boards of districts No. 1, 7 and 9: 'Inasmuch as delegates who attend the joint convention will be directly familiar with the work on hand at that time, we therefore recommend that local unions select the delegates from among only such delegates as have attended the joint convention.'"

The intent of the recommendation is to secure as far as possible a gathering of conservative men, prepared to discuss the issue calmly and not be too willing to adopt the last resort, a strike. In this recommendation the hand of John Mitchell is to be plainly seen. There is only one other question, besides the recognition of the Union, to be considered as a part of the demands—that of the eight-hour day. The coal operators have made an absolute statement that they will not make this concession. The issues are insignificant, compared to those which preceded the strike of 1900 as well as that of 1902. In private conversation the operators are very confident that there will be no strike. There are those who claim that private negotiations are at present being conducted for an amicable settlement, and that these may be made apparent at the convention in Shamokin, and that they will constitute as great a surprise for the miners as for the general public. Everything points to the probability that there will be no strike, and in the anthracite region there is absolutely no strike talk.

In connection with the renewal of the agreement between the operators and the miners, there is a remarkable unanimity for the continuance of the Conciliation Board, with some reform in its procedure, to expedite the transaction of the business. It is said that a project will be submitted which will be entirely satisfactory to both sides. Whatever else may be done, both operators and miners desire the continuance of this useful body, which has been such a powerful element for the maintenance of peace in the anthracite region for the past three years. The machinery, however, can be improved upon. It was patterned upon the plan of the South Wales Conciliation Board, without sufficient allowance for the varying conditions. Having had the benefit of three years' experience, it will not now be difficult to amend the methods whereby its usefulness will be increased.

According to the report of Commissioner Neill, the miners will receive an increase of 6% upon their October earnings, being an increase of 1% upon the preceding month.

The event in the anthracite region during the past week was the resignation of Superintendent Kudlick, who was connected with Coxe Brothers Co. for many years. With the acquisition of the property by the Lehigh Valley Co. he resigned. Mr. Kudlick was well known in the anthracite region.

There is an unfortunate contest in Carbon county in connection with the mine inspector recently allowed for that territory. There were two candidates, Morgan O. Morgan, who secured his certificate of competency from the board in Lackawanna county, and Isaac Davies, whose certificate was secured from the board in Luzerne county. The former was nominated by the Republicans and was elected, while Davies was nominated by the Democrats. Previous to the election the validity of Morgan's certificate was fought out in the courts, when it was decided that the people should first pass upon the matter and that the legality of the election should afterward be passed upon by the court. Morgan will not get his commission until the court decides as to whether he was legally qualified, it being maintained that he should have passed the necessary examination in Luzerne county.

David D. Jones, of Warrior Run, died a few ways ago, at the age of 53 years, and thus passed away one of the remarkable figures of the anthracite field. He had been foreman for many years, and it was his proud boast that during all that time no man under his supervision had been seriously injured. It is claimed that his record cannot be equaled in any coalfield. He was a nephew of Chief Inspector Roderick, of the State Bureau of Mines.

The Conciliation Board has sent back to Umpire Neill his decision in grievance No. 124 for further disposition. It was from the miners in the Centralia colliery, of the Lehigh Valley Co. When the case was heard before Mr. Neill in New York, he asked whether it would not be better to submit to the interpretation of the Commission's award, and in his decision he plainly said that the company had no right to make any reduction during the life of the award. The company now contends that the conditions prevailing in that particular vein existed prior to April 1, 1902. At the request of the mine workers the dcision was sent back for further disposition.

The fire which has raged in the Coalbrook mine of the Delaware & Hudson Co. for more than twelve months has been extinguished. All that time three shifts of men have been employed daily in fighting the fire.

The firemen employed at the big steam plant of the Lehigh Valley Co. at Henry colliery, Plains, went out on strike because of a reduction in the working force. The men left work without the sanction of the local union, and must return before the matter can be taken before the Board of Conciliation or their case taken up by the company.

The State authorities have now taken up the question of the peculiar diseases which has proved so fatal to so many mine mules in the Shamokin district. The State veterinarian investigating the outbreak is unable to diagnose the malady. The collieries are idle, and will not resume until a new consignment of mules is received.

The Lehigh Valley Co. is inviting bids for driving a tunnel from the Wharton to the Buck Mountain vein in the Jeansville colliery, a distance of 400 ft. The company is also asking proposals for the sinking of a shaft at Primrose colliery, near Mahanoy city, from the main level a depth of about 350 ft. to the basin.

The Lehigh Valley Co. announced on Saturday the changes consequent upon their taking possession of the Coxe properties, the transfers going into effect on Monday. David Davis, of Hazleton, will take charge of the Coxe collieries at Drifton, and will be succeeded by Thomas Thomas, now division superintendent at

Pittston, who will be succeeded by W. D. Owens, of Exeter.

A large coal dump at the Seneca colliery, of the Lehigh Valley Coal Co., was discovered to be on fire a few days ago. Costly precautions are being taken to save the entire dump.

Toronto. Nov. 15.

A report has been widely circulated that a Detroit firm is erecting a smelter at Argentine, near Haileybury, in the Temiskaming district, for the treatment of silver-cobalt ores. Nothing is known of the matter in mining circles here. There have been several propositions of this kind under consideration, some of which may finally mature, but it is not generally believed that any practical steps have yet been taken.

The date for the general mining conference to be held in Toronto, when delegates from the various mining centers will present their views as regards changes in the mining laws to the provincial Government, has been fixed for Dec. 12. The proceedings are likely to last for some days.

The following mining companies have been incorporated under the laws of Ontario:

Gordon Cobalt-Silver Mining Co., Ltd.; capital, $200,000; head office, Toronto; provisional directors—John F. Lennox, James D. Lamont, Wm. N. Irwin, Sidney B. Woods and Thomas H. Lennox.

Ontario-Minnesota Mining Co., Ltd.; capital, $60,000; head office, Port Arthur; provisional directors—Josiah Davis Ensign, Geo. A. Elder, Victor Stearns, Wilfrid W. Blackshaw and George F. Piper.

Cobalt-Canadian Mining Co., Ltd.; capital, $500,000; head office, Kingsville; provisional directors—Seger Lincoln McKay, B. Jasperson, George Jasperson, Darius Wigle, Wm. A. Smith and H. J. Cooper.

Mining leases for locations in the Rainy river district, held by the Flint Lake Gold Mining Co. and the Westerfield Mining & Improvement Co., have been cancelled for default in payment of rent.

Victoria, B. C. Nov. 4.

Cariboo.—It has been announced that the big hydraulic gold mining property at Bullion, Cariboo district, of which John B. Hobson has been in charge for about ten years, has been purchased by a New York syndicate, consisting of Messrs. Guggenheim, John Hays Hammond, and others. The consideration is stated to have been about $1,000,000. It is understood that sufficient capital is available for bringing in some 5,000 miners' inches additional water, thereby more than doubling the present supply. During Mr. Hobson's period of management $1,050,000 worth of gold has been recovered, but, with the exception of in one or two years, there has not been sufficient water to operate right through the season. This difficulty will now be removed, and largely increased returns may be expected to result.

Ainsworth.—The Canadian Metal Co., which is being financed by French capitalists, has secured control of the Pilot Bay smelter, on Kootenay lake, and will operate it in connection with the zinc smelter it has been built at Frank, southwest Alberta. Erection of the Pilot Bay smelter was begun in 1891, but construction work was suspended for two years and it was not until the latter part of 1904 that the works were completed. Difficulties were experienced in 1896 in obtaining dry ores for fluxing the silver-lead ores treated; also in getting good coke and coal. Then the average grade of ore produced at the mine from which the main supply was drawn was low. Eventually, early in 1896, the smelter was closed down, and with the exception of the concentrator having been used for a time in 1896, it has been inoperative ever since. The extensive work of putting it in running order is in progress and it is expected that it will shortly be in operation again.

The Highlander mine, at Ainsworth, owned by the Highlander Mill & Mining Co., H. M. Stevenson, manager, has come to the rescue of the Hall Mining & Smelting Co.'s smelter at Nelson, by shipping enough silver-lead ore to keep those works going for the present, and so obviated what would otherwise have been the necessity for closing down. The Highlander will probably maintain shipments of ore of good grade at the rate of about 20 tons a day.

East Kootenay.—The amount of the payrolls at the Crow's Nest Pass Coal Co.'s three collieries for the month of September was as follows: Coal Creek, $79,309; Michel, $42,530; Carbonado, $17,303; total, $139,142. The output of coal for the month was: Coal Creek, 38,278 tons; Michel, 25,049 tons, and Carbonado, 8,159 tons; total, 71,486 tons.

Slocan.—The Lucky Jim mine, situated near the boundary line between the Ainsworth and Slocan mining divisions, and which since late in 1904 has been producing ore carrying a high percentage of zinc, has paid its owners, Messrs. Geo. F. Hughes and John Wolverton, about $80,000 during the year 1905. Mr. Hughes, who holds by far the greater interest in this mine, has shown much enterprise in mining in the district, and the Lucky Jim is rewarding him well for his persistence in continuing development work on the several properties he acquired.

Ymir.—A California mining engineer has been examining the Ymir mine preparatory to reporting on the property and advising the best plan of development under the changed conditions brought about by recent discoveries of new orebodies of value. Oliver Wethered, one of the directors of the Ymir Gold Mines, Ltd., lately arrived from London, England, to confer with the manager, E. M. Hand. It is understood that a plan for the economic working of the mine will shortly be determined upon and that extensive development will follow.

Rossland.—The Le Roi Mining Co.'s smelter, at Northport, Wash., has been closed down, consequent upon the directors having arranged to ship Le Roi ore to the Canadian Smelting Works, Trail, B. C., for treatment there.

A later development of Le Roi difficulties is that the late general manager and managing director, Anthony J. McMillan, has brought suit in the State of Washington to restrain the directors of the Le Roi Mining Co. from dismantling the Northport smelter. A temporary restraining order has been issued in the Superior Court, at Colville, Wash. The specific ground of action is the allegation that notwithstanding the board of trustees and directors of the Le Roi Mining Co. is without legal authority to enter into any scheme of amalgamation, it has, in disregard of the best interests of the shareholders, connived with the officers of the War Eagle and Centre Star Mines, the Trail smelter and other mines and coal lands to abandon the Northport smelter, and is treating the amalgamation scheme as perfected. In pursuance of this alleged conspiracy, instructions have been issued to A. I. Goodell, superintendent of the smelter, to commence removing the machinery and dismantling the plant, notably to ship one of the large blowers to the Trail smelter. John H. Mackenzie, acting general manager of the Le Roi Mining Co., and A. I. Goodell, smelter manager, are also joined as defendants.

The September report of the Le Roi mine shows that 8,150 tons of ore were shipped to the Northport and Trail smelters; valuable contents, 3,079 oz. gold, 3,050 oz. silver, and 172,850 lb. copper. Estimated profit after deduction of cost of mining, smelting, realization and depreciation, $17,000. Expenditure on development work during the month, $10,000.

London. Nov. 4.

Your readers will remember that two months ago I reported that the Tyee Copper Co., in Vanvouver Island, was entering on an anxious time, owing to developments not opening up new bodies of ore, and at the same time I mentioned that the control of the company had passed into the hands of the people who had provided the new capital to build the smelter four years ago. Since then F. O. Harvey, of London, who is connected with the Mason & Barry group, has visited the Tyee properties, and after a thorough examination, has come to the conclusion that the present prospects are not bright. He estimates that the ore available is not more than 12,000 tons, and he can find

no evidence to show that ore must be expected with depth. He recommends exploratory work, to be conducted in several directions, but does not appear to be very sanguine as to the result, for he warns the shareholders that a time will occur before long when the output will have to be suspended at least for a time.

Another British Columbia company, owned in England, is the Hall Mining & Smelting Co., operating at Nelson. This company has just issued its report for the year ended June 30 last. The mines are leased to Mr. Davys, and during the year a trifling profit has been made, amounting to a few hundred pounds, from the ore won by him. The developments conducted by Mr. Davys continue to open up small bodies of ore, but nothing indicates the presence of bodies that can be worked on a large scale. The company also owns the Emma mine, which contains fluxing ore. This mine is leased to the British Columbia Copper Co., which extracts 25,000 tons during the year. The Hall smelter has been in operation the greater part of the year, and realized a profit of £5,000. The total profit for the year was just over £6,000, which has to be applied toward reducing the debit balance of £22,000 with which the year commenced. The present prospects, both from the mining point of view and as regards the future of the smelter, do not indicate any improvement in the situation.

The Central Chile Copper Co., which owns the Panulcillo and other mines, near Coquimbo, appears to have settled down as a regular producer, after having passed through a very checkered career. During 1904 the smelters treated 43,900 tons of ore, producing matte containing 2,254 tons of fine copper, and as the plant is being increased the production for 1905 will be greater. Until this summer the company shipped the matte to England and never received anything for the gold and silver contents. A new contract has been made, and the matte is now sent to New York. Shipments are made monthly, and the first two made during September and October contained, in the aggregate, 420 tons of copper, 8,166 oz. silver and 233 oz. gold. At many points on the properties, the developments are opening up extremely well, and it is stated that there is 2,000,000 tons of 4% ore in the Cocinera alone. The directors are contemplating the erection of a converting plant, and for this purpose are issuing 30,000 new shares at £1 each, all of which have been taken up. Some two years ago, when writing of this company, I mentioned that it was then the intention of the directors to adopt a new process, of doubtful value, for dealing with the matte, in which they were personally interested. The proposition has, fortunately, been dropped, and an ordinary, well-established process has been wisely adopted instead.

General Mining News.

Lake Superior Ore Shipments.—Shipments of iron ore by lake from the Lake Superior region in October were very large, though they were 180,550 tons less than in September. The total was 4,257,000 tons, an increase of 222,228 tons over October, 1904. For the season of navigation up to Nov. 3 the shipments by ports were as follows:

	1904.	1905.
Escanaba	2,951,532	4,545,922
Gladstone	480	
Marquette	1,548,682	2,631,210
Ashland	1,902,236	3,033,774
Superior	3,482,255	4,574,407
Duluth	3,945,051	7,895,976
Two Harbors	3,826,523	7,049,326
Total	17,657,159	29,730,615

The total increase this year was 12,073,456 tons, or 68.4%. By months during the season of 1905 the shipments were: April, 1,195,173; May, 4,619,431; June, 4,999,450; July, 5,224,620; August, 4,999,930; September, 4,425,550; October, 4,245,000 tons. The indications now are that the total for the season will be over 33,000,000 tons.

ALASKA.

A new strike is reported on a creek tributary to the Tanana river, about 200 miles from Tanana. It is said to be rich, but little is known about it yet.

The Nome tundra, on what is known as the second beach, promises to yield better than was formerly expected. In the past season a number of claims were staked on it, some of which have already changed hands at high figures.

A miner, who has just returned to Nome from Kugarok, speaks well of that division: "All that country needs now is water, and there are several ditches under construction. As soon as they are finished mining will receive a great impetus. The ditches, or at least some of them, would have been finished this summer but for the fact that it was very difficult to get frieght in over the tundra. It rained for 39 days without a break and disorganized all traffic. However, in spite of the difficulties encountered, much progress was made. A syndicate, headed by Major French, has been formed to build a railroad from Teller into the heart of the Kugarok. The road will be 65 miles long, and will tap the heart of that country."

ARIZONA.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—This company informs us that the production of its mines, at Clifton, for the month of October, was 1,227 short tons of copper.

CALIFORNIA.

AMADOR COUNTY.

Argonaut Mining Co.—This company at Jackson, now the heaviest dividend-payer in the county, disbursed $20,000 to its stockholders in October.

Bunker Hill Mining Co.—In this property, E. H. Harrington, superintendent, the output is increasing monthly. The 20-stamp mill is operated continuously.

Wildman-Mahoney Mining Co.—In this property, at Sutter Creek, John Ross, Jr., superintendent, the orebody has widened to 80 ft. of milling rock, which is one of the largest ledges ever uncovered in the county.

Horn.—Work has been resumed on this mine at Defender. A small vein of $12 to $15 rock has been found.

EL DORADO COUNTY.

Hydraulic Mining Applications.—The California-Débris Commission is considering the granting of permits to hydraulic to the Landecker Mining Co. near Placerville, draining into Webber creek, which drains into the South Fork of the America river; and the Bear Flat mine near Kelsey, draining into Bear Flat cañon which drains into Rock creek.

INYO COUNTY.

Golden Argus Mining Co.—In this mine, Snow's cañon, Ballarat, they have drifted 365 ft. on the vein from a crosscut, and have high values. They are now preparing to sink 250 ft. below the bottom of the tunnel, which is called the 200-ft. level

Dunlap Group.—This property, including five claims eight miles from Bishop, is about to be developed by local people. An average of 18 assays of the ore was $36 per ton.

MARIPOSA COUNTY.

Hite Mine.—This mine, now owned by W. M. Kirkhoff and associates, of Minneapolis, is to have extensive improvements made upon it, to bring it up to its old position as a gold producer. New veins have been discovered, one of which is said to be 14 ft. wide. It was uncovered at a depth of 900 ft. and the old workings were within a few inches of one side of it. There are 40 men at work in the mine.

NEVADA COUNTY.

Murchie Mining Co.—In the bottom of the shaft of this mine, at Nevada City, there is a large vein heavy with sulphurets, and there is another body of the same kind on the 400 level.

PLACER COUNTY.

Dairy Farm Extension.—Superintendent J. S. Mills is arranging to instal machine drills at this mine, in order to make more rapid time in shaft sinking.

SAN BERNARDINO COUNTY.

Golden Chief Mining Co.—This company has acquired the following claims near Victor: Gold Pin, Big Horn, Homestake, Sunset, Yellow Jacket and Humming Bird.

SHASTA COUNTY.

Hiatt.—At this mine, Quartz Hill, after many delays, the water has been lowered below the main level. The work of retimbering and repairing the main shaft will at once be commenced, and the mine opened after an idleness of two years.

Bromide Mines Co.—This new company has acquired 14 claims on Lower Springs district, and will shortly commence development work on a large scale. The mines are the Volcano, Bullseye, Spring Cabin, Bromide, Peak, Arizona, California, Leopard, Lost Lead, Lost Lead No. 2, North End, President and Extension. These claims adjoin the Crown Deep mine.

Section Sixteen.—This section, Township 33 N. range 5 W., lies in the heart of the mineral belt between Kennett and the Balakalala mine. There are numerous known ledges, and some of them will now be developed by L. S. Barnes and Joseph H. Thain, of Redding, who have secured a lease and option on the whole section.

SIERRA COUNTY.

Forest City Mining Co.—Numerous surface improvements at this mine, at Forest, are about completed, including several buildings. Underground, a drift is being driven on the gravel found on the upper level. One pay-streak has been passed through, but the main one still lies ahead.

Rainbow.—At this mine, Alleghany, owned by H. H. Noble, of San Francisco, the old 10-stamp mill, after being overhauled, is again in operation. The mine, formerly a heavy producer, was recently started up again.

TRINITY COUNTY.

Bob's Farm Mining Co.—This company, operating the Mountain Boomer mine at New River, is raising on a 2-ft. ledge and taking out good ore. The mill will soon be started.

TUOLUMNE COUNTY.

Georgiana.—This mine, on what is believed to be the Providence lead, is showing up some fine free-gold ore from different workings. The vein is large and well defined.

VENTURA COUNTY.

Orofino.—A strike has been made in this mine on Frazier mountain, by Chester King and O. C. Dunn. Some of the ore runs $40 to $60 per ton. A five-stamp mill has been ordered and 10 miners are at work.

New Frazier Consolidated Mining Co.—This company has taken over the old Frazier gold mine. F. E. Sargent, of Pasadena, is superintendent, and most of the stock is owned by citizens of Pasadena. The main 1,400-ft. tunnel is to be retimbered and new drifts run.

Bay View Borax Co.—This company has made the payment and now owns the property of the Standard Borax Co. A good vein of borax has been struck. Mr. Cleve is the superintendent.

COLORADO.

GILPIN COUNTY.

Old Town.—Ress & Co., of Russell Gulch, Colo., have received returns from their first shipment in the east 900-ft. level which show values of over $100 per ton in gold, silver and copper.

Forks Group.—Local people have sold their lease interests in a group of three fractional claims situated in Nevada district to T. Watson, of New York, representing Eastern investors. Arrangements will be made to instal a plant of machinery, erect new shaft buildings and operate on a large scale. Property is owned by Senator H. M. Teller and other Denver people, and is a regular producer of mill and smelting ores of a very fair grade.

Ann Rutledge Mining & Milling Co.—A contract has been given to the Colorado Iron Works, of Denver, for the erection of a modern mill with a daily capacity of about 50 tons, mill to be in running shape by Feb. 1. The company owns North Star group, in which Youngstown, Ohio, people are interested, and J. McMillen, Central City, Colo., is manager.

Galena.—F. H. Kengel, of Detroit, Mich., is here for the purpose of resuming operations at this property, near Central City, having associated men of capital for the active operation. The main shaft is down over 700 ft., and very little overhauling work is necessary before active work is commenced.

CLEAR CREEK COUNTY.

Domingo.—This group, in East Argentine district, consisting of two lode claims, four mill sites and a tunnel site, has been sold to E. D. Quigley, of Denver, representing a syndicate of Eastern capitalists, the price being $50,000, on which a cash payment has been made. The property is a producer of silver and lead ores, and the purchasers are figuring on installing a plant of machinery capable of running five machine drills. H. J. Christ, Georgetown, Colo., has been appointed manager.

Flexible.—Daniel Roberts, of Georgetown, Colo., has organized a strong company for the purpose of operating this group on Saxon mountain, and the crosscut tunnel is to be driven several hundred feet.

Sunburst.—Teagarden & Bonham, of Georgetown, have received returns from a shipment to sampling works giving high values in silver.

Sterling Mines Co.—Arrangements are being made for extensive improvements in the equipment at the Beaver mine and for the installation of a large plant of machinery to be placed at the portal of the Sterling tunnel, electric power to be used for the tunnel plant. J. J. Hoban, Idaho Springs, Colo., is manager.

Atlantic.—Messrs. Berry & Cooper, of Idaho Springs, representing Eastern people, purchased this property in Georgia gulch, and arrangements are under way for the active operation by tunnel workings.

Wyandotte Mining & Milling Co.—Three Temple electric drills have been installed for operations in the Gold Dust and Lilly adits, and indications point to increased shipments. C. M. Berry, Idaho Springs, is manager.

BOULDER COUNTY.

Clinton Mining & Milling Co.—Copeland and Hendrickson, lessees on the Logan mine near Jamestown, have received high returns from a shipment of first-class ores.

Cashier Gold Mining & Milling Co.—Manager Thomas L. Wood, of Boulder, has gone East to consult with the stockholders of this property, at Camp Albion, as to the advisability of installing heavier machinery and the erection of a mill to handle the silver-lead ores. Heavy developments have been kept up, and the property gives promise of being a heavy producer.

ROUTT COUNTY.

Boston-Sierra Madre Mining Co.—Manager L. A. Pease, of Steamboat Springs, Colo., has gone East to arrange for the erection of a concentrating plant on the property of the company, operating at Three Forks, Snake river. The property is situated on the boundary lines of Colorado and Wyoming, and the concentrates from the mill would be shipped from Rawlins, Wyoming.

Three Counties Mining & Milling Co.—C. D. Mansfield, of Steamboat Springs, president and general manager of this company, owning a large group of lode and placer claims, intends operating the property by the hydraulic process next season, and will require new machinery. The company has expended about $100,000.

Coal Sale.—The Weir Coal Co., of Kansas City, Mo., is reported to have located 5,000 acres of coal land near Hayden, Colo. F. A. Metcalf, of Steamboat Springs and Yampa, Colo., is the agent of the Eastern coal men.

TELLER COUNTY—CRIPPLE CREEK.

Maud S. Gold Mining Co.—This company, which has a lease on the property of the National Gold Mining Co. adjoining the city of Cripple Creek, is taking out some very fair ore. The company has a long lease on the property and it is thought that the prospects are good.

Hoosier Mine.—This property, on Tenderfoot hill, has been recently started up under lease by Harry Shell and associates. At one time the property produced a considerable amount of ore, but in recent years nothing has been shipped. Several other properties are also being worked in the vicinity.

Mary Nevin.—A good shoot of ore is reported as uncovered in this property by lessee Jackson. The property is situated on Beacon hill, near the present westerly boundary of the producing district. Considerable work has been done lately and the strike was not unexpected.

Strong Gold Mining Co.—A shoot of rich ore of good width has been opened in the 1,000-ft. level of this property re-

cently. This property has been one of the steady producers of the district for a number of years and the find of good ore at this level is very gratifying. The property adjoins the Portland and lies near the Independence.

Drainage Tunnel.—There will be a meeting of the drainage committee of the Mine Owners' Association in Colorado Springs to decide on the course to be adopted with regard to the drainage tunnel proposition. Some decisive action will undoubtedly soon be taken looking to the commencement of the tunel. General opinion seems to be in favor of tunnel No. 2 as outlined in engineer Brunton's report.

GEORGIA.

BARTOW COUNTY.

Etowah Development Co.—This company has been organized at Cartersville, to develop iron and manganese properties near that place. O. T. Peoples is president; L. S. Munford, general manager and engineer; R. S. Munford, secretary and treasurer.

IDAHO.

IDAHO COUNTY.

American Eagle Mining Co.—This company, owning the gold property of the same name at Elk City, is planning to resume operations, and a meeting of the stockholders will be held tomorrow to arrange for advances of money sufficient to start work. It is not expected to start the mill again until enough ore is in sight to justify a continuous run.

KOOTENAI COUNTY.

Panhandle Smelting Co.—H. M. Williams, promoter of this company, at Lake Pend d'Oreille, Idaho, has sold his interest in the concern to others. The plant is nearly completed.

SHOSHONE COUNTY.

Snowstorm.—Consideration of the levying of an 8c. assessment on the Snowstorm copper mine, near Mullan, in the Cœur d'Alene district of Idaho, has been postponed till Nov. 20. Meanwhile stockholders are invited to submit individual opinions on the advisability of the assessment. It is favored by Thomas L. Greenough, of the Morning mine, who is one of the chief owners. J. H. Heward, who is associated with him in a lease on the upper workings of the Snowstorm, has submitted to the company a scheme of improvements, to cost $78,910, to include 3,100 ft. of tunnels and raises, and the installation of a large compressor. The Snowstorm has been a steady shipper of copper ore, and there is considerable opposition by minority stockholders, who think that the property ought to be put on a profitable basis without the necessity of contributions.

KENTUCKY.

West Kentucky Coal Co.—This company has arranged for the issue of $2,000,000 in 5% bonds to provide funds to develop its property. The company owns five producing mines and about 23,000 acres of coal-land in Crittenden, Webster and Union counties, in the vicinity of Sturgis, Ky., and at the junction of the Tradewater river with the Ohio river.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—Jennings Heywood Syndicate No. 4, which came in a salt-water producer is now flowing 2,500 bbl. of oil under air pressure—a packer was set 30 ft. from the bottom and the liner plugged. This well proves the field 200 ft. further to the south.

Bass & Benckenstein's Rouge well, which has been sanded up for some months, is now flowing 3,000 bbl. daily.

The production here has increased to 27,000 bbl.—crude sells for 25c. per barrel.

NEW MEXICO.

LUNA COUNTY.

Deming Smelter.—This smelter, operated by the Luna Lead Co., of Deming, blew in Oct. 15, having on hand a sufficient tonnage of ore to insure continuous operation for a long time. The management of the smelter has taken special pains to make rates to small lead mining operators that will permit the mining and shipping of low-grade ores which were heretofore considered unprofitable. This policy has resulted in awakening the interest of a great many mine owners in New Mexico and eastern Arizona, who had practically discontinued development work. From present indications the smelter promises to prove a boon to the lead properties in those territories.

PENNSYLVANIA.

BITUMINOUS COAL.

Cascade Coal & Coke Co.—This company is building 200 additional coke-ovens at its plant at Tyler. A new coal-washing plant is to be put up also.

Washington Coal & Coke Co.—The company is building 500 coke ovens at Star Junction. In connection with these ovens, arrangements are being made to convey the gas to the boiler-house, where it will be used as fuel in four large Stirling boilers.

SOUTH DAKOTA.

CUSTER COUNTY.

Fuller's Earth.—A large deposit of fuller's earth has been opened up on H. Denton's farm, near Piedmont. The vein is 20 ft. thick. U. E. Traer, of Hot Springs, S. D., and associates own the deposit.

Four Mile.—Men have been put to work on five claims at Four Mile by A. J. Goldstein, of Syracuse, New York.

Saginaw.—The new strike at the 300-ft. level in the Saginaw is opening up a vein of high-grade ore. The same was encountered in an 80-ft. drift from the 200-ft. level. The company is getting plans for a mill.

LAWRENCE COUNTY.

Victoria Mining Co.—The power plant will be started this week by this company in the new mill on Spearfish creek. A shaft has been started on the recently bonded ground at Ragged Top.

Wauconda Mining Co.—Extensive development work is to be started on this property, owned by John Blatt, James McQuillan, Albert Steele, Fred Sawyer, George Oliver, Charles Snow, J. F. Meyers, Harry Occleston, all of Lead, and Chicago capitalists. Three separate veins have been opened up with shafts and crosscuts.

Homestake Co.—Mrs. Phoebe Hearst, the largest stockholder of this company, has visited the property. The mine was closed down half a day for the reception in her honor.

Puritan.—A carload of cyanide tanks has arrived for this mine. The ore is found amenable to amalgamation and cyanide.

Golden Reward Mining Co.—Harris Franklin, for years general manager of this company, has resigned, and Henry Schnitzel, of Lead, is now in his place. It is reported that the cyanide mill in Deadwood is to be enlarged, and possibly the smelter blown in by the new management.

Golden Crest.—A high-grade shoot of ore has been encountered in a 120-ft. shaft in this property.

Homestake Extension Co.—A survey has been completed for the mill-site of the 100-stamp mill to be erected by this company in Deadwood.

South Extension Homestake Mining Co.—Articles of incorporation have been filed for this company, capital 1,500,000 shares, par value $1. A. H. Oleson, of Deadwood, is general manager. The company has acquired the Skelly mine, located in the city of Lead, surrounded by the Homestake mine. A mill-site has been secured at Pluma. Colonel Britton, at Brooklyn, and associates are interested.

PENNINGTON COUNTY.

Clara Bell.—At a depth of 300 ft. the Clara Bell vein has been encountered with values as rich as at the 200-ft. level. Charles Bartlett, of Cleveland, Ohio, has purchased the control of the mine. A new hoist has been completed, and the Tremain mill has been replaced by a 10-stamp mill.

Cochran.—James Cochran, of Rochford, has opened up three veins of ore during the summer on his Alta Lode mine, four miles west of Rochford. He operated a Huntington mill most of the season. His ore veins aggregate 75 ft. in width at the 150-ft. level, and mill $6 to $8 a ton gold.

Grandview.—L. A. Richards, of Silver City, has purchased the Grandview mine at that place from Steve Bryer. A shaft will be sunk from the 98-ft. level to the 300-ft. level. The ore carries gold, silver and antimony.

Montezuma.—An ore compressor is being installed on this property, two miles east of Rochford. A double-track tunnel is being run to get a 15-ft. vein of free milling and concentrating ore. Excavation is being made for a stamp-mill. Peter Stankovitch, of Lead, is general manager

Black Tom Co.—This company is building a 10-stamp mill on Slate creek.

American Tungsten Co.—John Truax, of Hill City, has purchased a steam hoisting plant to develop a tungsten property near that place.

LAWRENCE COUNTY.

Victoria Mining Co.—This company has secured options on 1,000 acres of additional ground adjoining its holdings. The new mill is enclosed and will soon be in commission.

Reliance Gold Mining Co.—A final payment of $3,000 has been made on 60 acres of ground by this company. This makes a total of over 400 acres paid for by the company. The last reports by John Blatchford, mine superintendent of the Golden Reward at Terry, estimates 1,000,000 tons of ore opened up.

Globe Mining Co.—A large test is being made on surface ore from this mine, preparatory to regular shipments to the Ogden mill in Deadwood.

PENNINGTON COUNTY.

Mainstay Co.—Sinking has been resumed in the Bismarck shaft. The mill is being run as much as the water supply will allow. Good returns are obtained.

Bullion Mining Co.—All machinery has been ordered by this company for a 600-ton plant, work upon which is in progress. F. H. Long, president, formerly of Chicago, is working at a new process in the mill. James Hartgering, of Deadwood, has contract for the mill. The ore will first be crushed in a chilian mill and amalgamated, then run over Wilfley concentrating tables. It will then pass through a dryer and into a tube mill, after which it will be cyanided. The Bullion mine has a large vein of low-grade ore. The property adjoins the HolyTerror-Keystone mine.

Blue Lead Mining Co.—A shaft has been started on the surface of this property. There is a large blow-out of copper ore at the surface. John Harnan, one of the principal owners of the Portland mine of Cripple Creek, is the leading person in the New Blue Lead Co. Sufficient money will be expended to thoroughly develop the copper vein which has been tapped by a 1,700-ft. tunnel.

Mystic Mill.—A carload of ore will be treated in the old Mystic mill this week, brought from a mine two miles from Custer, owned by A. T. Faey, C. W. Robbins and others of Custer. If the ore is rich enough, a regular run will be made.

Custer Peak Mining Co.—Copper ore, 1% to 3%, has been encountered in this mine, 15 miles south of Lead.

TENNESSEE.

CUMBERLAND COUNTY.

Chicago-Tennessee Coal & Coke Co.—The Henry E. Weaver Coal Co., of Chicago, has leased the coking plant of this company at Waldensia, and will fire the ovens in a few days, preparatory work already having begun. The plant has not been operated since the spring. It is located about three-fourths of a mile from the Tennessee Central railroad, to which it is connected by a spur track at Waldensia station. The purpose of the Weaver Co. is said to be the utilization of the plant for coking and screening the coal from its mines at Ozone, five miles distant.

TEXAS.

JEFFERSON COUNTY.

Beauomnt.—The Attorney General of Texas has filed suits for the first quarter's taxes and penalties under the Kennedy bill against the the following: Producers Oil Co., $3,068; Moonshine Oil Co., $3,672; Little Jap Oil Co., $3,208; Texas Co., $20,993; Sun Oil Co., $1,351; Southwest Oil Co., $1,472; Higgins Oil Co., $1,-236.

Contractor Sturm is drilling a wildcat well near Pine Island bayou.

The Texas Glass Co. is asking the donation of a suitable site in Port Arthur for a factory. The company claims to own an inexhaustible supply of glass sand on Village creek, which empties into the Neches river 30 miles above Beaumont.

Dayton not having increased its production and Humble showing a steady decline, prices for crude have advanced 2 to 4c. in the various fields.

Present daily output and current prices are as follows: Spindletop, 3,600; 45c. Batson, 7,600; 34c. Sour Lake, 6,300; 42c. Saratoga, 6,700; 35c. Dayton, 800. Humble, 25,000; 36c. Jennings, 26,000; 25c. per barrel.

Humble output will continue to decline slowly, while Jennings will remain the largest producer, for the limits of the field have not been defined and development will be stimulated by the higher prices for crude.

LIBERTY COUNTY.

Dayton.—Brooks Oil Co.'s well is in and doing 300 bbl. The output is now 700 bbl. produced by the above well, Sun Oil Co. No. 3, Higgins Paraffin Oil Co. wells No. 5 and 7.

West Liberty Oil Co. is drilling on the Mettler place, three miles from the producing wells.

UTAH.

BEAVER COUNTY.

Majestic Copper.—A shipment of ore from the Harrington & Hickory mine this week was sold on controls showing 24.4% lead and 77.6 oz. in silver. A car per week is being marketed.

Frisco Contact.—The shaft, double compartment, being sunk on this property, is down a little over 400 feet.

JUAB COUNTY.

Scranton.—This company has closed a contract for an output of 2,000 tons of zinc ore, the same going to the Lanyon Zinc Co., at Iola, Kansas.

SALT LAKE COUNTY.

Mountain Chief.—At a depth of 125 ft. in the shaft a vein of copper ore showing high values has been encountered.

SUMMIT COUNTY.

Comstock.—Developments at this property continue encouraging.

Scottish Chief.—The ledge for which the management has been drifting on the 700 level has been encountered and contains a good showing of copper ore.

TOOELE COUNTY.

Utah Mine.—What seems to be quite an important orebody has been opened in the Galena property.

SALT LAKE COUNTY.

Bingham Copper Co.—This company has filed its articles of incorporation. Simon Bamberger is president; W. H. Dickson, vice-president; W. F. Adams, treasurer, and Sidney Bamberger, manager; all of Salt Lake. Property recently acquired in Bingham will be developed.

SUMMIT COUNTY.

American Flag.—At the annual meeting of this company at Park City the old board of directors was elected, which organized with Capt. T. F. Singiser, of Salt Lake, president; R. G. Brooks, of Scranton, Pa., vice-president; E. B. Palmer, of Salt Lake, secretary. A new hoisting plant is in commission at the mine.

WASHINGTON.

OKANOGAN COUNTY.

Georgie Moore & Hercules.—A vein of white quartz, 17 ft. wide, is traceable over a distance of 300 ft. The ore is free milling, and averages from $10 to $12 in gold value per ton. Assays have run as high as $150.74 in gold. A tunnel in along the foot wall 100 ft. is to be continued.

Whiskey Hill Group.—A tunnel has been driven 630 ft. and crossed several veins. There are 24 claims in the group, upon which much surface work has been done. The veins, mostly of white quartz, are from 1 ft. to 32 ft. wide. The values run from 40c. to $69 a ton in gold and silver, and small nuggets of gold have been found in quartz on one of the claims of the group. Whiskey Hill comprises a group of rolling hills, mostly of limestone, with

very little vegetation but sage brush and low fir and pine trees. The Okanogan river flows at the base.

Tungsten Consolidated Mining & Milling Co.—Articles of incorporation have been filed with the Secretary of State and County Auditor for a company formed under the laws of Washington. The principal place of business is Loomis, Okanogan county, Wash. The nominal capital is 1,500,000 shares, at a par value of $1 each. The trustees named for the first six months are Frank M. Dallam, William McDaniel, Henry Bahrs, Samuel A. Johnson and A. M. Polk. The object of the company is to develop a group of claims on which a discovery of wolframite was made last August. The claims are situated in the Cascade mountains, 45 miles west of Loomis.

Pinnacle.—Traditional stories are told of 30 or 40 sacks of very rich gold ore taken from the croppings 18 years ago. There is no doubt that two years ago a rich pocket of ore was discovered, with native gold freely distributed through the rock. A company was organized, when a tramway was laid to get the ore down to the wagon road, as the vein crops near the top of a high and steep hill. The cost of the tramway is said to have reached $15,000, and all the ore mined since is said to have realized from $10,000 to $12,000 and came from a tunnel. Report says that all of the good ore to be found on that level has been taken out and sold. A second tunnel was started to get about 200 ft. depth on the dip of the vein. It is in about 300 ft. and is as crooked as a ram's horn, but has not yet reached the vein. A third tunnel has been started at about 700 ft. lower elevation than tunnel No. 2. J. W. Miller, one of the early owners and now in charge of the Pinnacle mine, says he is putting his own money into it, and no one is permitted to go into the upper tunnel. The reason for that is not apparent. The new tunnel it is thought will have to run 1,500 ft. to tap the main vein, but is expected to cross other veins on the Pinnacle group of claims.

Grand View.—No. 3 tunnel is on 300 ft., and the face is reported by the management to show a width of 3 ft. of ore, one assay from which ran $34 and another $37.33 in gold per ton.

Copper World Extension.—The vertical shaft is down 210 ft., the last 10 ft. being used for a sump. At a depth of 200 ft. a crosscut, started southward, toward the hanging wall, is in 15 ft. In the sump the formation is fairly solid, and quartz coming in at the bottom is supposed to be the underlying stratum of the vein.

Palmer Mountain Tunnel & Power Co.—The latest measurement of the flume shows 4,400 linear feet. completed. The roofing and inclosing of the concrete power-house, as also the construction of the mill-race, is finished.

Foreign Mining News.

CANADA.

Dr. Robert Bell, acting director of the Dominion Geological Survey, returned to Ottawa, Nov. 6, after a tour of inspection on the Pacific slope. He stated in an interview that now that a complete geological map of Canada had been obtained, the work of the Survey would be reorganized and its efforts devoted entirely to mining geology. His visit to the Yukon had convinced him that although the country had a long future before it as a mining community, the system would necessarily be changed. The poor man's mine was about worked out and henceforth the principal mining would have to be done by large companies with abundant capital and machinery.

ONTARIO.

One of the diamond drills of the Ontario provincial government is being sent to Cobalt to be put in operation at La Rose mine. The depth of the deposits has never yet been ascertained, as so far mining has been confined to pick and shovel work. It is hoped, by the use of the drill, to discover the depth of the veins and the thickness of the lode, and to set at rest the doubts which have been frequently expressed as to the permanency of the camp.

NOVA SCOTIA—CAPE BRETON.

The output of the Dominion Coal Co.'s mines at Sydney for October was 333,317 tons, as compared with 294,038 tons for October, 1904, and 297,266 tons for October, 1903. The shipments of last month amounted to 323,884 tons.

The coal-washing plant of the Dominion Steel & Iron Co., at Sydney, which has just been completed and taken over by the company, is having an extensive addition made, comprising a trestle, pockets and conveyors to provide for the storage of 15,000 tons of coal. It is anticipated that the first section of the new work will be completed before the new year.

MEXICO.

CHIHUAHUA.

The State government in Chihuahua has promulgated regulations relating to the payment of mining royalties. These new regulations provide as follows:

(1) The value of metals in an ore shall be the basis of all mining taxes.

(2) Silver and gold in bars or bulk pay 1½% of their value.

(3) Crushed ore and concentrate pay 1% of their metallic value.

(4) Ore and metal reduced or smelted within or without the State are taxed on the total value, according to the works assay returns.

(5) The State executive will accept igualas for imports on metals when asked for on the following basis: (1) 1½% when the value of the metals contained is $50 or over per ton; (2) 1⅜% when the value is $40 and less than $50 per ton; (3) 1¼% when $30 and less than $40 per ton; (4) 1% when the values are less than $30 per ton.

MEXICO.

DURANGO—INDE DISTRICT.

A 40-ton matte-furnace is just completed on La Cruz mine and about to be blown in. Ernesto Abila, owner.

La Roca smelter, 50 tons capacity, is running, with good results. It is operated by some of the old employees of the Descubridora smelter, assisted by Pittsburg capital.

The Carambola mine encountered a body of copper (argentiferous) ore, 10 ft. thick, at depth of 50 ft, running from 4 to 30% copper and from 30 to 300 oz. silver. Exporting 20 to 30 tons per day. Owner, D. Pablo Palacios.

The Mina del Agua is installling pumping machinery and sinking new three-compartment vertical shaft, which is now down 100 ft. Managed by F. H. Husted.

At the Portrillo mine a new hoist has been installed and is taking out 20 tons per day of old fills left by Kansas City Co. Casimiro Mitchell, manager.

Los Machos mine is installing a 20-ton experimental concentrating plant and taking out about 30 tons per day of ore, running from 40 to 50% lead and 60 to 90 oz. silver. G. A. Burr, manager.

The Gavalana mine is opening a 166-ft. tunnel to cut the vein 320 ft. below apex. Don Joaquin Martes, owner.

NEW CALEDONIA.

Shipments of ores from the colony for July and the seven months ending July 31 are reported as follows by the *Bulletin du Commerce*, of Noumea, as follows, in metric tons:

	July	Seven mos.
Nickel ore	7,145	65,172
Cobalt ore	286	5,283
Chrome ore	6,224	26,942

The July shipments of chrome ore were all to the United States.

Coal Trade Review.

NEW YORK, Nov. 15.

ANTHRACITE.

The hard-coal trade shows steady improvement at the approach of cold weather. Stocks on hand have not yet begun to feel the demand, but shippers have no difficulty in disposing promptly of all their arrivals.

Current prices on retail trade in the city range from $6.25 for white ash coal in broken and domestic sizes delivered to residences down to $5.50 for similar deliveries to retail dealers. The steam sizes range from $3.50 and $3 up to $4.25, according to the class of trade. Domestic prices will receive another advance of 25c. on Dec. 1, at which price they will remain until April 1, 1906. At the same date the

steam sizes will have a 10c. advance until next Spring. Wholesale prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

Demand in the Atlantic seaboard soft-coal trade exceeds the supply. All shippers have an accumulation of orders on hand, which just now seems to be increasing. It is hoped that with the cessation of shipments to the ice-making ports, shippers may be able to hold their own. Demand, in fact, seems to be stronger than is usually expected at this season of the year, and is accentuated by the scarcity of cars. This car question is becoming more general. Some dealers fear that enough coal cannot be brought forward to supply the necessities, although it is generally thought that the situation will work itself out with time. Prices range around $2.75 f. o. b. New York harbor shipping points for the ordinary steam grades; the principal question, however, is to find any coal to sell. Every dealer is taking refuge under the terms of his contract and, by exercising the usual conditions and the terms of the trade, prevents an individual from securing more than his monthly proportion.

Trade in the far East is calling for more coal than can be shipped there. The loading facilities at all shipping ports are congested. Trade along the Sound is hard up for coal, owing to its failure to take advantage of its opportunities last summer. New York harbor is absorbing all the coal that comes that way and would take more if it could be had, but no shipping point has a surplus. All-rail trade is settling to a condition of monthly allotments and these are cut wherever possible.

Car supply is poor and so variable that no producer can count on having a particular number of cars every day. Transportation is excellent except when affected by local conditions. Vessels in the coastwise trade are in fairly good supply, and rates hold firm at the quotations given two weeks ago.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Nov. 4, in short tons:

	1904.	1905.	Changes.
Anthracite	3,770,051	3,823,486	I. 53,435
Bituminous	22,788,263	24,975,466	I. 2,187,203
Coke	7,197,619	9,343,063	I. 2,145,444
Total	33,755,933	38,142,015	I. 4,386,082

The increase in anthracite this year has been light. The gain in coke is the largest proportionally.

Shipments of anthracite coal in October and the ten months ending Oct. 31 were as follows, in long tons:

	1904.	1905.	Changes.
October	5,131,542	5,205,694	I. 74,152
Ten months	47,305,310	50,593,504	I. 3,288,194

The increase for the ten months this year was 7%. The October shipments have been exceeded in four months this year.

Birmingham. Nov. 13.

The railroad car shortage in the Alabama coalfields is being felt again, and on all sides the coal operators are making complaint. There is a strong demand for coal and the consumers are urging prompt deliveries. The production is heavy and at a number of mines there is delay because of the transportation. In Walker county, on the Frisco, the operators are loud in their complaint about the car service. The Frisco has purchased 1,500 new coal cars and delivery wil be made on the order every week after this one. The Alabama Great Southern, Seaboard Air Line, Central of Georgia, Louisville & Nashville and Southern Railway are all said to be looking for immediate deliveries on new coal cars.

T. H. Aldrich & Son have disposed of their mines in Marion county, at Brilliant, to R. C. Middleton and associates. The purchasers intend to develop the property on a more extensive scale than before. The Pratt Consolidated Coal Co. will, immediately after the first of the coming year, begin opening several new mines. The output is to be increased to 20,000 tons of coal a day.

Coke is still scarce and in great demand. It is necessary to bring coke to this market to meet all demands.

Chicago. Nov. 13.

All features of the coal trade indicate continued and growing strength. Western coals are in stronger demand than for many years, with a restricted supply that has advanced prices in the last week 10 to 20c. The car shortage, as dealers see it, will continue all winter, and the requirements of retailers will be heavy, because of the general indifference to laying in supplies before the coming of active business. Most dealers are known to be short of anthracite, and this business is increasing by spurts, at each cold wave. Manufacturers find themselves unable, in many cases, to get coal on their contracts, and this makes lively selling of coal for immediate use.

Eastern as well as Western coals are in short supply, and the general conditions apply to them also. The end of the navigation season finds dock supplies of anthracite heavy, and no probability of such anxiety about local stocks as has existed in previous years. But concerning car service for distribution of anthracite throughout Western territory and for the movement of smokeless, Youghiogheny, Pittsburg, Hocking and Indiana and Illinois coals, there is anxiety that produces a speculative condition of the market.

All grades of coal are selling up to, or in advance of, the circular prices, with the probability of further advances soon. Indiana and Illinois bring $2.50@$3 for lump and egg; $2.10@$2.35 for run-of-mine, and $1.25@$1.75 for screenings. Fine coals are advancing notably, after having been the only weak feature of the market for the last month.

Smokeless sells for $4.30, lump and egg, and $3.45@$3.55 for run-of-mine. Splint is $3.75@$4 and Youghiogheny $3.50@$3.65. The demand for Eastern coals is strong, and customers need to be assured only prompt delivery to buy largely.

Cleveland. Nov. 14.

The coal market in this territory continues to display artificial strength. The demand is still good and is increasing, and the supply is seemingly short. It is apparent, however, that all mines are far below their normal production and that cars are still too short to permit the mines to ship freely. This is especially true of run-of-mine steam coal, which is selling at $1.10 at the mines in the Ohio and Pennsylvania territory, with some coal selling as high as $1.15 at the mines. The demand is strong for slack also, and the prices keep up well. This is especially true as the lake season draws to a close. Ohio slack is now selling at 75@80c. at the mines, with Pennsylvania slack at 70@75c. at the mines.

One of the strongest features to the market is coke, which is now selling at $4 at the oven for the best grades of 72-hour foundry coke, the supply being short. Furnace coke is in demand at $3.50 at the ovens. In this market the car shortage has also an influence.

With boats in such demand in the grain trade that 5c. per 100 lb. has been paid on grain from the head of the lakes, the supply of tonnage available for the coal trade is not large and the shippers are forced to pay fancy rates. There has been an effort on the part of the shippers to live up to their contracts. They are now doing so, but are paying higher rates. Lake three-quarter coal is sold in small quantities at $2.10 f. o. b. boats, Lake Erie docks, with some of the shippers getting better prices.

Pittsburg. Nov. 14.

Coal.—Prices are firm this week, on a basis of $1.20 a ton for run-of-mine at the mine. The demand is good, but deliveries are not up to requirements, owing to the continued car shortage. The railroad mines are operating irregularly, but all the river mines are in operation. There is a great deal of talk among the miners regarding the mining rate for next year, and it seems certain that this district will urge a demand for an advance of 10c. a ton at the national convention in January, equal to about 12% over the rate that has prevailed since April 1, 1904. John Mitchell, president of the United Mine Workers, is in Pittsburg,

attending the convention of the American Federation of Labor, and will be here for about two weeks. During his stay he has arranged to address four mass-meetings of miners in different parts of the district. Mr. Mitchell declines to discuss the wage question, only to say there positively will be no reduction in the mining rate.

Connellsville Coke.—The car supply for the coke region was a trifle better last week, and there was a slight increase in shipments. The demand is heavy, and $3.05@$3.10 a ton is being paid for furnace coke for shipment this month; but contracts for the first half of next year are being made at the rate of $3 a ton. Foundry coke is quoted at $3.50 a ton. The production for the week amounted to 271,891 tons. The shipments aggregated 11,911 cars, distributed as follows: To Pittsburg and river points, 4,285 cars; to points west of Pittsburg, 6,399 cars; to points east of Everson, 1,287 cars. The total shipments from the Masontown and Connellsville fields amounted to 344,849 tons.

San Francisco. Nov. 9.

Trade continues quiet, with no change in prices. Fuel oil is in steady demand for steam purposes.

For coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wellsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

Nov. 15.

Exports of fuel from Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Coal	13,028,463	12,969,107	D. 59,356
Brown coal	16,987	14,874	D. 2,113
Coke	2,021,001	20,020,550	D. 451
Total	15,066,451	15,004,531	D. 62,920

The chief exports of coal were to Austria, Holland and Belgium; of coke to France and Austria. The coke exports included this year 18,206 tons to the United States.

Imports of fuel into Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904	1905	Changes.
Coal	5,128,395	7,051,100	I. 1,922,705
Brown coal	5,518,189	5,776,660	I. 258,471
Coke	381,919	530,885	I. 148,966
Total	11,028,503	13,358,645	I. 2,330,142

The increase shown was due chiefly to the strike of the miners in the early part of the year. The more important imports of coal were from Great Britain. The brown coal, or lignite, was all from Austria.

The production of coal in Germany for the nine months ending Sept. 30 is reported as follows, in metric tons.

	1904	1905	Changes.
Coal	88,910,291	89,156,984	I. 246,693
Brown coal	34,938,033	37,570,666	I. 2,632,633
Total mined	123,848 324	126,727,650	I. 2,879,326
Coke made	9,095,480	10,874,526.	I. 1,779,046
Briquettes made	8,311,871	9,428,936	I. 1,117,065

The production shows a small increase, notwithstanding the losses caused by the miners' strike in Rhenish-Westphalian district.

Iron Trade Review.

New York, Nov. 15.

Conditions in the iron and steel trade are very much the same as reported last week—only a little more so. Notwithstanding recent heavy buying, there is still a rush for material. Most furnaces and mills are well sold up into next year, and there is little material to be had for delivery this year in a direct way. Smaller buyers have to go to jobbers and second hands, paying premiums proportionate to their needs, if they want early deliveries.

Pig-iron prices are on a high level, but this is to some extent justified by higher costs. The advance in coke has already been noted; and there is no doubt of an increase of 25 to 50c. in Lake ore prices, though little or nothing positive has been done about next season's contracts. With all the active demand, there seems to be very little speculative iron on the market.

Car shortage continues to be a serious matter, and there is much delay in delivery of raw materials and in shipping finished products. The Southern railroads are giving better service than those in the North, and there is not much delay in shipping from Alabama furnaces.

Pig Iron Production.—Reports from the furnaces show that on Nov. 1 there were 278 furnaces in blast, having an aggregate weekly capacity of 460,500 tons; an increase of 15,000 tons over Oct. 1. The *Iron Age* estimates that the total production in October was 2,053,127 tons, these figures including only coke and anthracite iron. About 30,000 tons should be added to this total for the charcoal furnaces.

Birmingham. Nov. 13.

What little iron there is to be had in Alabama is finding a ready demand. Some of the companies in this district are accepting a little business, from 100 to 500 tons, delivery within three months, but the aggregate amount of these transactions does not amount to a great deal. The greater portion of the make in the Birmingham district and throughout the State has been sold ahead for at least three months into next year. Some large consumers were in the Birmingham market again recently and were disappointed at the small amount of iron that was to be had. The little lots of iron being sold are bringing top-notch figures. The accumulated iron is moving off rapidly. The railroads are not delaying shipments to any extent and there is a repetition of the report that more iron is being shipped out than is being manufactured.

The production in Alabama is about holding its own. Four furnaces are under repairs, and will be blown in either during the coming month or immediately thereafter. One furnace is being rebuilt, practically a new furnace, while one new furnace is being erected in this State. The furnaces under repairs and which will be ready for the torch during the coming month are located at Thomas (Republic Iron & Steel Co.), Woodward (Woodward Iron Co.) and Bessemer (Tennessee Coal, Iron & Railroad Co.). The Tennessee Co. expects to blow in Alice furnace, in the city, some time in January. The rebuilt furnace at Ensley will hardly be ready for operation until spring. The Alabama Consolidated Coal & Iron Co. will have its new furnace at Gadsden ready about the last of the coming summer.

The following prices prevail for pig iron: No. 1 foundry, $14.50@$15; No. 2 foundry, $14; No. 3 foundry, $13.50; No. 4 foundry, $12.75@$13.25; gray forge, $12.50@$13; No. 1 soft, $14.50@$15; No. 2 soft, $14@$14.50.

In steel circles in this district there is no change, the plants all being in full operation, with a demand for all the product that can be gotten out. The rolling mills are also working steadily, and the future prospects are exceedingly bright. A number of orders for finished iron and steel are on hand.

Announcement is made that New Orleans parties will erect a large foundry and machine shop in East Birmingham, three miles from the city. The site has been purchased from T. H. Aldrich. Sugar machinery and other specialties will be made.

Labor is still scarce among the furnaces, mills and foundries in the Birmingham district.

Chicago. Nov. 13.

Firmness and continued heavy buying characterize the local iron market. Northern and Southern pig iron are largely sought for deliveries in the first half of 1906, with a few orders running over the third quarter of the year. Finished products are strong, and there is every indication of a rise in prices and in the demand for both pig iron and its products.

Southern No. 2 sells for $14@$14.50 Birmingham, or $17.65@$18.15 Chicago.

Northern brings $18@$18.50, with the business fairly well divided between the two. Sellers of Southern are inclined to bull the market and are holding off for higher prices in many cases, but there is plenty of iron available at the figures quoted.

Spot business is increasing on iron and coke, the latter being especially high now. Connellsville 72-hour is quoted at $4.10 at the ovens, or $6.75 Chicago. Standard cokes are correspondingly high, with difficulty in obtaining shipments at any price. The anxiety over coke is marked, with the probability that it will cause much speculation within the next month, should the car shortage continue.

Cleveland. Nov. 14.

Iron Ore.—Rather than pay the high rates now demanded for wild boats in the ore trade, most of the shippers are confining themselves to their contract tonnage. The shipments are already over 2,000,000 tons ahead of the best record, and the demand is not correspondingly high. This permits the shippers to ease down somewhat in the movement of their material. Very few, if any, boats are now being employed wild. Another thing is that the ore is frozen in the pockets in the upper lake territory and this has a tendency to make the boats steer clear of the ore trade on account of the delay. Some little ore has been sold of late at $4 for Bessemer old range, f. o. b. docks, Lake Erie ports, or at an advance of 25c. over the prices obtained this season. General buying for next year's delivery has not started, however.

Pig Iron.—The producer is now able to make about his own price on pig iron for prompt shipment. There is an extremely strong demand for it and the supply is limited. As high as $17.25 at furnace has been paid. The general price has not moved above $17 at the furnace for advanced delivery on No. 2 foundry. About the same is true of the steel-making irons, bessemer being in good demand all through the territory, with the supply short. The prices on bessemer, basic and malleable are about the same as those on the foundry irons.

Finished Material.—The strongest spots in the market at present are light rails, structural shapes, billets and bar iron. Light rails have sold as high as $33 a ton at the mill for 16-lb. Angles from 4 to 8 in. are hardly to be obtained and high prices are paid, some consumers paying 3c. in the yard to the jobbers. Many of the mills producing bar iron report being sold up till July 1 next, and others are commanding 1.75@1.80c. at mill for the product. On billets about any reasonable price would be paid if the material could be had, but the supply is short. Pipe is a little stronger, some of the recent weakness disappearing.

New York. Nov. 15.

Pig Iron.—A large business is still in sight, and some good contracts for 1906 delivery have been closed. Prices are firm, and higher figures are asked.

For Northern iron in large lots, we quote: No. 1X, $18.75; No. 2X, $18.25; No. 2 plain, $17.25@$17.50; forge, $16.50 @$17. Basic is still in demand; $17.75 is asked for Alabama, and 25c. less for Northern. Virginia foundry is held around $18.60 for No. 1 and $18.10 for No. 2. For Southern iron, on dock, quotations are higher: No. 1 foundry, $18.75; No. 2, $18.25; No. 3, $17.50; No. 4, $17; No. 1 soft, $18.75; No. 2 soft, $18.25; gray forge, $16.50; No. 2 foundry and No. 2 soft are still rather scarce.

Business in warrants has been better. Latest prices for December are $17.10 bid, $17.50 asked, for regular warrants; $17.20 bid, $17.60 asked, for foundry warrants.

Cast-Iron Pipe.—Business continues good. Quotations are: $27.50 per net ton, carload lots at tidewater, for 6-in. pipe. Higher prices are expected.

Bars.—Business is good and prices firm. Iron bars are 1.795c., tidewater, for plain, and 1.845c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price, but 2.50c. is probable soon.

Plates.—Steel plates are still in strong demand. Tank plates are 1.745@1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width. For early delivery premiums are asked, depending on the necessities of buyers.

Structural Material.—Small orders continue to come in, and deliveries are uncertain. Prices are nominally unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery. Premiums are asked for early deliveries.

Steel Rails.—No change in standard sections. Light rails are in demand, prices ranging from $25 for 35-lb., up to $31 for 12-lb. rails.

Old Material.—Demand is strong, and prices are firm. No. 1 railroad wrought is $22@$23; No. 1 yard wrought, $20@$21; machinery cast, $14.50@$15; heavy steel melting scrap, $17@$18. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. Nov. 13.

Pig Iron.—The advances in pig iron have taken a good many of our smaller buyers by surprise. They had been holding off, buying in a hand-to-mouth way, hoping that conditions would change. The present situation cannot be easily put on paper. Nearly all the larger consumers are pretty well covered, and there are few or none of the smaller consumers who are in immediate need of iron. The threatening aspect of the entire market is stimulating most of the users of forge and foundry iron to provide for their forward requirements, and it is this class of buyers who have been taken by surprise at the latest prices quoted. An advance of 25c. is insisted upon on foundry grades, and in basic iron the nominal advance is 50c. Our office people claim that there will be a shortage of pig iron supply before the crisis is reached, and they say that there is nothing that can prevent the quoting of higher figures for all Pennsylvania brands. There are heavy dealings in pipe iron, and supplies are difficult to obtain, excepting for late delivery. The consumption of forge iron is very heavy. Quotations may be given at $17.50@$18 for basic; $16.50 for gray forge; No. 2X foundry, $18@$18.50; No. 2 plain, $17.50 @$18; malleable iron is quoted at $19, and low phosphorus, $23.50@$24.

Steel Billets.—Quotations for steel billets have been practically withdrawn, and there is a good deal of inquiry; but negotiations are still hanging fire for large lots, and until they are closed it will be impossible to give any exact figures as to prices.

Bars.—The bar mills of middle and eastern Pennsylvania are full, and quotations are given at $1.83½c., so far as actual orders are concerned; the week's business has been rather light, but there is a good deal in sight. Premium quotations are the rule on all small business that is being offered.

Sheets.—Sheet-iron quotations continue at 2.30@2.70c., and there is a rapid distribution among the smaller buyers.

Pipes and Tubes.—The market continues quite active, consumption even exceeding recently recorded limits. Prices are very firm, and the mills are sold up months ahead.

Merchant Steel.—A fair business is being done in merchant steel, and a goodly amount of business has been recently sent to the mills.

Plate Iron.—The business in iron and steel plate continues very active, and the mills are overwhelmed with business. Much of the new business coming in is for delivery during December and January. Quotations are actually higher than those published, and urgent consumers are obliged to bid the market up among themselves in order to be assured of supplies of material as fast as they require them.

Structural Material.—Heavy orders have been placed for structural material, the actual figures on which it would be a little risky to state. The mill people here state that their chief difficulty is in seeing that their customers are supplied according to terms agreed upon. There are rumors of large quantities of structural

shapes being wanted for terminal facilities, and the business will probably be placed next week.

Steel Rails.—Several Eastern and Western railroad companies have placed orders within the past six days, the aggregate of which is stated by one authority to be 60,000 tons, but this is believed to be below the actual business.

Old Rails.—Old iron rails are quoted at $25, which they would bring if the rails could be delivered.

Scrap.—Everything in the scrap line is high, and some dealers are endeavoring to accumulate stocks and hold them for stronger prices. To-day's quotations for choice railroad scrap are $23; machinery scrap, $16.50; No. 1 steel scrap, $18; and No. 1 yard scrap, $20 per ton.

Pittsburg. Nov. 14.

The United States Steel Corporation has practically closed a deal for 50,000 tons of bessemer pig iron for delivery in the first quarter of next year at $17, Valley furnaces. Negotiations have been going on with the Bessemer Pig Iron Association for several days and effort are being made to get a greater tonnage. Independent interests, it is said, will not talk pig iron for next year or quote a price and there are indications that the $20 mark will be reached. Furnaces are not offering any bessemer or basic iron this week and middlemen who have some for sale are naming $18 as the price for delivery this month. Several small lots of bessemer pig iron were sold this week at $17.25, Valley furnace, the highest point of the year. There have been no sales of any consequence of foundry iron during the week, and No. 2 grade is quoted at $17@$18, Valley; furnaces do not seem desirous of selling even at this price. Gray forge also is in demand, and the price is higher this week. Pig-iron production records are being broken and stocks are not accumulating, indicating that it is going into consumption. An inquiry was received yesterday for 5,000 tons of basic iron, but the order has not been placed, although it seems certain that at least $17, Valley, would willingly be paid.

The feature of the iron market this week was a stiff advance in the price of ferro-manganese, $75 having been paid for one lot for delivery before Dec. 1 and for another lot for delivery during the coming month. The price is expected to reach $90 before the close of the year. The Carnegie Steel Co., a producer of ferro, has been a buyer for some time and last week bought 1,000 tons for November delivery at $65 and made a contract for 3,500 tons for delivery in the first half of next year at $62.50. One cause of the scarcity and high price is the cutting off of the supply of manganese ore from Russia, on account of the troubles in that country. Some consumers who have contracts for ferro with foreign makers have been forced to buy at high prices because it is impossible to get deliveries on the contracts.

About the only business being done in billets is on trades for scrap. Two deals have just been closed aggregating over 10,000 tons of open-hearth billets for heavy melting scrap. The prices named in such transactions are only nominal. Muck-bar is scarce and the local producers are out of the market and are buying rather than selling. Prices have advanced and an offer of $30.50 a ton was made to-day and refused. It is likely that Eastern mills will begin offering muck-bar in this market. While there is not a great deal of new business in finished steel products, the mills are all busy and many are behind in deliveries, as specifications on contracts are coming in freely. The American Bridge Co. has booked a number of good orders for structural material within the past week for erection work for next year. The rail tonnage is light, but the mills are well filled with orders for 1906 delivery. Light rails are very active, and the mills are sold for several months ahead. Prices are firm on a basis of $26 a ton for sections 25 to 45 lb. and higher for lighter sections. Premiums of about $1 a ton are asked for deliveries within a month. Merchant steel bars are scarce and premiums over the pool price can readily be obtained for prompt delivery. Common iron bars are in demand and mills are pretty well sold up. The rate of 1.80c. Youngstown, named by the Republic Iron & Steel Co. several weeks ago, is regarded as the market price. This is equal to a rate of 1.84¾c. Pittsburg. The bi-monthly adjustment of wages which under the scale of the Amalgamated Association of Iron, Steel & Tin Workers is based on the average selling price of bar iron, was made today. At the last adjustment, two months ago, the average was 1.40c., which established a rate of $5.50 a ton for puddlers. Sales have been made at a higher figure and the average for September and October was expected to be at least 1.50c., which would give the puddlers in the union rolling mills of the country a rate of $5.75 a ton, and the finishers will get an increase of a trifle over 2%. The settlement, however, showed an average of a fraction over 1.40c. and there will be no changes. The bi-monthly adjustment also will be made on sheets and tin-plate, but there will be no change in the wage rate in these branches, as all sales made during the past two months have been below the base of the wage scales.

Pig Iron.—Outside of the purchase of the United States Steel Corporation there have been no large transactions in pig iron. Some small lots of bessemer sold at $17.25, Valley furnaces, and there also were some sales of foundry at about the same price. No. 2 foundry is quoted at $17@$18, Valley. There is a good demand for gray forge, but furnaces do not seem anxious to sell. The latest quotations range from $16.85 to $17.35 Pittsburg.

Steel.—There is but little change in the billet situation. But few sales are recorded and quotations are nominal at $26 for bessemer and $27 for open-hearth. Some trades have been made of open-hearth billets for heavy melting stock. Merchant steel bars are still quoted at 1.50c. and plates at 1.60c.

Sheets.—The market is not very strong and prices are low. Black sheets are quoted at 2.25@2.30c., and galvanized at $3.30@3.35c. for No. 28 gauge.

Ferro-Manganese.—Prices jumped from $10 to $12 a ton during the week, and the lowest quotation to-day is $75 a ton.

Cartagena, Spain. Oct. 28.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 2,500 tons Colorado ore, and one lot of 180 tons specular ore, both to Great Britain. There is a steady inquiry for nearly every class of iron and manganiferous ores, but merchants are to a great extent now holding back from selling, with the idea that prices will still further advance. Freights still continue very firm and consequently shipments at present are few and far between.

Quotations for iron ores are unchanged. Ordinary 50% ore is 7s. 6d.@7s. 10d.; special low phosphorus, 8s. 2d.@8s. 6d.; specular ore, 58% iron, 11s.; S. P. Campanil, 9s. 6d. per ton. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 8d. for 35% iron and 12% manganese, up to 17s. 3d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Dusseldorf, Germany. Nov. 2.

The output of the German blast-furnaces in September was 953,780 metric tons of pig iron. This is 14,543 tons less than in August, a difference less than is accounted for by the difference of one day in the months. For the nine months ending Sept. 30 the total output was, in metric tons:

	—1904.—		—1905.—	
	Tons.	Per ct.	Tons.	Per ct.
Foundry iron	1,359,345	18.1	1,379,000	17.3
Forge iron	623,572	8.3	597,450	7.5
Steel pig	459,534	6.1	501,005	6.3
Bessemer pig	310,790	4.1	315,614	4.0
Thomas pig	4,777,728	63.4	5,170,527	64.9
Total	7,530,969	100.0	7,963,596	100.0

The total increase was 432,627 tons, or 5.7%. The chief increase was in Thomas, or basic pig; there were small gains in foundry iron, in bessemer pig, and in steel pig, which includes ferromanganese, spiegeleisen, ferrosilicon and all similar alloys. Forge iron showed a decrease.

Imports of iron and steel into Germany were smaller this year than in 1904. The figures for the nine months ending Sept. 30 are, in metric tons.

	1904.	1905.	Changes.
Pig iron	133,116	110,590	D. 22,526
Other iron and steel	126,798	124,595	D. 2,203
Total	259,914	235,185	D. 24,729

Imports of slag and slag products, chiefly from Belgium, were 643,110 tons in 1904, and 648,854 tons in 1905; an increase of 5,744 tons. Imports of iron ores were 4,736,450 tons in 1904; and 4,553,749 tons in 1895, showing a decrease of 182,701 tons. Imports of manganese ore were 224,318 tons in 1904, and 213,925 tons in 1905; a decrease of 10,393 tons.

Exports for the nine months are reported as follows, in metric tons:

	1904.	1905.	Changes.
Pig iron	172,486	271,422	I. 98,936
Other iron and steel	1,910,123	2,071,010	I. 160,887
Totals	2,082,609	2,342,432	I. 259,823

Exports of iron ore—chiefly to France and Belgium—were 2,577,954 tons in 1904, and 2,815,762 tons in 1905; an increase of 237,808 tons this year. Exports of slag and slag products were 19,732 tons, a decrease of 8,299 tons from last year.

Heavy Chemicals and Minerals.

NEW YORK, Nov. 15.

Heavy chemicals sturdily hold their general strength, but with a stronger market for several products.

American sulphur is of course master of the domestic situation, and shows a tendency to raise the price, an advance of ⅛ of a dollar per ton being the last announcement. We note herewith the prices for the American product. Sicilian is steadily quoted the same for Atlantic ports as the Louisiana sulphur.

Pyrite continues unchanged and in steady demand, the production being constantly absorbed, mostly by the fertilizer makers. Spanish pyrite runs from 48 to 50% sulphur, but carries some arsenic. The domestic carries only 45% sulphur, but is free from arsenic, and is thus preferred by certain manufacturers.

Nitrate of soda reports the same advanced prices, with a market which still continues very strong, and which is liable to present further strength. No stocks accumulate, the market absorption being ready and complete. The contract price for future is slightly (5c.) below that for immediate delivery.

Sulphate of copper, in its slight advance of recent date, seems to be in sympathy with the metal.

Phosphate companies still report the same peculiar situation. This amounts to delayed activity between seller and buyer, largely on account of the rigorous freights. The sellers seem unwilling to place large sales, preferring to wait for the higher prices (which may not materialize for some time). Actual prices show little, if any, change from those recently quoted.

Tin crystals are quoted at the same price as last month (22c. per lb.); tin bichloride is quoted at 10c., a slight advance over quotation for last month.

PRICES.

Sulphur.		
Louisiana, New York, Boston or Portland	ton	$22.25
Philadelphia or Baltimore	"	22.75
Pyrite.		
Domestic, furnace size	Unit	11c.
Fines	"	10c.
Imported, lump, At. ports	"	10@11c.
" fines " "	"	9½@10c.
" furnace size	"	11½@12c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.		
Boric, crystals	per lb.	.10
powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Nitric acid, 36°, 100 lb		$4.75
38°, 100 lb		5.25
40°, 100 lb		5.50
42°, 100 lb		5.75
Oxalic acid, com'l, 100 lb		$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton		13.50@14.50
60°, 100 lb. in carboys		1.05
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.20
66°, bulk, ton		21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb		$5.35
Nitrate of Soda, 100 lb.	96%	2.25
" " "	95%	2.22½
Sulphate of Ammonia, per 100 lb		3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain§ or Europe.
*Fla., hard rock	$4.75@8.00	$10.67@11.85
land pebble	4.00@4.25	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%		7.04@ 7.71
58@63%		6.15@ 6.60
Tunis (Gafsa)		6.00@ 6.60
Christmas Isle		13.28@14.11
Ocean Isle		13.60@14.45
Somme, Fr		11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C. §These figures are slightly higher owing to the advance in freights.

Metal Market.

New York, Nov. 15.

Gold and Silver Exports and Imports.

At all United States Ports in Sept. and Year.

Metal.	September		Year.	
	1904.	1905.	1904.	1905.
Gold Exp	$2,744,448	$1,412,904	$83,039,908	$42,677,921
Imp	4,241,035	5,499,685	68,694,670	30,295,595
Exc	E. $1,496,587	I. $4,086,781	E.$14,345,238	E$12,382,326
Silv. Exp	3,378,775	5,527,469	$9,129,920	29,443,210
Imp	2,003,636	3,803,840	19,677,231	24,470,838
Exc	E. $1,375,139	E. $1,723,619	E.$19,452,689	$14,972,377

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending November 11, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$79,500	$77,516	$701,662	$55,921
1905	34,509,503	10,482,569	30,021,374	3,861,519
1904	96,895,489	6,382,842	33,416,850	1,113,853
1903	31,739,485	15,841,149	30,178,405	3,253,332

Exports of gold for the week this year were to Haiti and Trinidad; of silver to London. Imports, both gold and silver, were from the West Indies, Mexico and South America.

A curtailment of loans, which will be unwelcome to the speculative element, will be made necessary by the fact that the New York bank returns this week show a total reserve slightly below the legal requirement. This has happened only four times previously in 15 years. It is due now entirely to large stock-exchange loans.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Nov. 11 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts	$1,125,089,900	$1,044,287,800
Deposits	1,176,045,000	1,028,318,800
Circulation	42,313,900	54,310,700
Specie	226,558,700	182,266,300
Legal tenders	76,347,100	72,384,600
Total reserve	$302,905,800	$254,650,900
Legal requirements	294,011,250	257,079,700
Balance surplus	$8,894,550	.....
Deficit	.....	$2,428,800

The reserve is below legal requirements for the first time in several years. Changes for the week this year were decreases of $13,984,600 in loans, $8,193,100 in specie, $2,699,700 in legal tenders, $24,459,700 in deposits and $46,800 in circulation.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated	$182,266,300	.....
England	159,443,425	.....
France	580,191,270	$219,056,295
Germany	149,810,000	49,935,000
Spain	74,895,000	112,110,000
Netherlands	32,999,500	29,895,000
Belgium	16,443,335	8,221,665
Italy	126,160,000	15,792,500
Russia	576,850,000	21,620,000
Austria	224,900,000	59,880,000

The returns of the Associated Banks of New York are of date Nov. 11, and the others Nov. 10. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

Shipments of silver from London to the East for the year up to Nov. 2 are as follows:

	1904.	1905.	Changes.
India	£8,309,168	£5,125,821	D.£3,183,347
China	372,722	804,246	I. 431,524
Straits	58,103	38,299	D. 19,804
Totals	£8,739,995	£5,968,366	D.£2,771,627

Receipts for the week this year were £157,700 from New York. Shipments were £1,100 to Gibraltar, £166,600 to India and £20,000 to China; £187,700 in all.

Indian exchange has been slightly easier; but all the Council bills offered in London were taken at an average of 16.03d. per rupee. Buying of silver for Indian coinage still continues.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars	$0.48½	$0.50
Peruvian soles and Chilean pesos	.44½	.46½
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

SILVER AND STERLING EXCHANGE.

Nov.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Nov.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
9	4.86	62⅞	29	13	4.85	62¾	29
10	4.85¾	62⅞	29	14	4.85	63⅛	29¼
11	4.85¾	62¾	29	15	4.85	63¼	29¼

Other Metals.

Daily Prices of Metals in New York.

Nov.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
9	16¼ @16⅜	16⅛ @16⅜	73⅛	32¾	5.15	6.05 @6.10	5.90 @5.95
10	16¼ @16⅜	16⅛ @16⅜	73¼	33	5.15	6.05 @6.10	5.90 @5.95
11	16¼ @16¾	16⅛ @16¾	....	33	5.15	6.05 @6.10	5.90 @5.95
13	16⅜ @16⅜	16¼ @16⅜	74	33⅛	5.15	6.05 @6.10	5.90 @5.95
14	16¼ @16⅜	16¾ @16⅜	75	33⅛	5.15	6.05 @6.10	5.90 @5.95
8	16⅜ @16¾	16¾ @16¾	75¼	33⅛	5.15	6.05 @6.10	5.90 @5.95

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

Copper.—Since the last report went to press, the demand for copper, which was previously of a more or less desultory character, assumed larger proportions, resulting finally in an outburst of activity at the beginning of this week which carried prices well above the recent level. Consumers both here and in Europe have become fully alive to the extremely strong statistical position of the metal, and have shown a disposition to supply themselves for the first quarter of next year, and even beyond. These developments practically insure the maintenance of the current level of prices for an indefinite time forward. The market closes firm and higher at 16½ @16¾c. for Lake, 16⅜@16⅝c. for electrolytic in cakes, wirebars and ingots, 16@ 16¼c. for casting copper.

The standard market is maintaining its recent characteristics in so far as future options are selling at a material backwardation, while spot, owing to a drive against the bears which is facilitated by the scarcity of supplies, closes at £75 5s. for spot, £72 15s. for three months.

Refined and manufactured sorts we quote: English tough, £76 15s.; best selected, £77 10s; strong sheets, £86; India sheets, £81; yellow metal, 7¾d.

Exports of copper from New York for the week are reported at 3,622 long tons. Our special correspondent reports the exports from Baltimore for the week at 2,182 long tons of fine copper.

Imports and exports of copper in Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904	1905	Changes.
Imports	79,304	77,498	D. 1,806
Exports	3,130	4,773	I. 1,643
Excess imports	76,174	72,725	D. 3,449

Imports of copper ores were 6,295 tons, a decrease of 248 tons. Exports of ore were 23,333 tons, an increase of 11,390 tons over last year. The decrease in the imports of metallic copper was 2.3% this year.

Tin.—The demand for this metal has been well sustained, and prices have shown a further advance. The premium on spot tin still prevails. Quotations at the close are 33⅜@33⅝, depending upon deliveries.

The London market has also shown a great deal of strength, and it is again reported that large orders have been placed from this side. The closing is £152 2s. 6d. for spot, £151 10s. for three months.

Imports and exports of tin in Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Imports	10,842	10,052	D. 790
Exports	2,284	2,230	D. 54
Excess imports	8,558	7,822	D. 736

These figures include tin scrap as well as metallic tin.

Lead.—The market is unchanged, the leading interest billing its current shipments at 5.15c. New York, 5.07½c. St. Louis.

There is a further advance in the London market, which closes at £15 6s. 3d. for Spanish lead, £15 7s. 6d. for English lead.

Imports and exports of lead in Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Imports	45,989	60,670	I. 14,681
Exports	17,709	18,271	I. 562
Balance imports	28,280	42,399	I. 14,119

Imports of lead ore were 60,717 tons in 1904 and 67,666 tons in 1905; an increase of 6,949 tons. Exports of ore were 1,140 tons, an increase of 58 tons.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is scarce and high. Latest sales are on a basis of 5.25c. for Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Oct. 28, that silver has been 14.75 reales per quintal. Exchange is 33.17 pesetas to £1. Pig lead is 78.25 reales per quintal, equal, on current exchange, to £13 11s. per long ton, f. o. b. Cartagena. Shipments for the week were 237 tons argentiferous, and 133 tons desilverized, to Marseilles; 626 tons argentiferous lead to London.

Spelter.—The market has been rather lifeless, and there has been a little more pressure to sell than for some time past. However, as the consumption is large, a material setback can hardly be looked for. The close is more or less nominal at 5.05@ 6.10c. New York, 5.90@5.95c. St. Louis.

The London market closes steady at £28 10s. for good ordinaries.

Imports and exports of spelter in Germany for the nine months ending Sept. 30 were as follows, in metric tons:

	1904.	1905.	Changes.
Exports	45,984	47,013	I. 1,029
Imports	16,624	21,286	I. 4,662
Bal. exports	29,360	25,727	D 3,633

Imports of zinc ore were 68,712 tons in 1904, and 92,477 tons in 1905; an increase of 23,765 tons. Exports of ore were 29,288 tons, an increase of 421 tons over last year.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is quiet, but very strong. Both prompt and future metal are selling on a basis of 6c., East St. Louis.

Antimony.—There has been a good demand for this metal, and sales have been made at 11@12c., depending upon brands.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@ 47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Imports of nickel into Germany for the nine months ending Sept. 30 were 1,143 metric tons in 1904, and 1,552 tons in 1905; an increase of 409 tons. Exports were 810 tons in 1904, and 746 tons in 1905; a decrease of 64 tons.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Imports of quicksilver into Germany for the nine months ending Sept. 30 were 514 metric tons in 1904, and 536 tons in 1905; an increase of 22 tons. Exports were 36 tons in 1904, and 28 tons in 1905; a decrease of 8 tons. A metric ton is 29.4 flasks.

Missouri Ore Market.

JOPLIN, Nov. 11.

The highest price reported paid for zinc ore was $55 and the assay basis price $50 to $52 per ton of 60% zinc, the higher grade ores being practically unchanged from last week, but with an undercurrent feeling among the purchasing agents for a lower level of prices, indicating that medium and lower grade ore may be slightly reduced next week. The price averaged $46.68.

The lead price resumed the upward trend begun two weeks ago. The first advance announced was $2 per ton, to $68, followed by a further advance, placing the price on the choicest bins of lead ore at $70 per ton. Prices averaged $67.90.

The lead shipment of the week was the largest of the year, and the zinc shipment was 910 tons above an average of the 45 weeks of the year. The combined value of the two ores sets a new precedent, exceeding by $30,000 any previous week.

Following are the shipments of zinc and lead from the various camps of the district for the week ending to-day:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City	3,423,350	1,370,030	$127,030
Joplin	3,258,870	226,760	90,280
Galena-Empire	928,900	164,960	26,050
Duenweg	540,750	131,090	17,150
Badger	580,870	.....	13,140
Oronogo	487,890	7,440	12,695
Alba	444,130	.....	11,540
Aurora	683,940	.....	10,900
Granby	470,500	11,000	7,875
Neck City	260,280	.....	6,760
Zincite	133,020	16,900	3,750
Prosperity	52,410	68,550	3,580
Sherwood	73,100	7,100	1,980
Spurgeon	92,890	1,910	1,910
Reeds	64,250	.....	1,540
Beef Branch	43,040	19,120	1,120
Scott City	42,520	.....	1,060
Totals	11,580,690	2,024,960	$339,160
45 weeks	439,446,770	54,266,880	$11,486,770
45 weeks last year	448,135,980	56,947,670	9,241,405

Zinc value, the week, $270,390; 45 weeks, $9,857,960
Lead value, the week, 68,770; 45 weeks, 1,628,810

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.	33.33	52.00	Jan.	55.55	61.50
Feb.	33.63	52.77	Feb.	56.37	57.62
March	35.40	47.40	March	57.20	57.20
April.	35.75	42.88	April.	58.00	58.00
May	34.87	43.31	May	57.77	58.27
June.	32.93	40.75	June.	56.60	57.80
July.	33.37	43.00	July	53.00	58.00
August.	37.55	48.83	August.	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50
October.	43.65	47.60	October.	53.50	63.86

Wisconsin Ore Market.

PLATTEVILLE, Nov. 10.

An unexpected competition among the buyers sent the price of 60% zinc ore up to $54. One of the buyers disregarded the assay basis entirely and paid as high as $54.50 for ore that did not quite reach 60% grade. The low-grade ore used in the manufactures of oxide and sulphuric acid is bringing a higher price than ever before, the demand in this district exceeding the supply considerably.

Lead continues firm and is selling at $31@$32 per 1,000lb., the highest price paid for a number of years, with only one car reported as sold.

The following is a partial list of the ores loaded the last 10 days, many of the camps as yet not being heard from:

	Zinc, Lb.	Lead, Lb.	Sulphur Ore, Lb.
Montfort	.....	.....	75,000
Livingston	100,000	.....	.....
Rewey	108,960	.....	.....
Cuba City	206,000	.....	.....
Benton	205,000	.....	.....
Buncombe	762,000	46,000	.....
Galena	178,300	.....	.....
Platteville	640,000	.....	.....
Total	2,200,260	46,000	75,000

Mining Stocks.

New York. Nov. 15.

In a general way, it may be said that speculation is now dependent upon the money situation. The prospects are for dear money, both here and in Europe, at least until after the turn of the year. On the New York exchange the public has not been a large factor, the heavy trading having been largely among groups of speculators. Dear money has tended this week toward a break in prices, notwithstanding efforts to hold up the market.

United States Steel closes at $36⅞ for the common, and $102⅛ for the preferred; American Smelting & Refining, which was largely traded in, at $140½ for the common, and $124 for the preferred; Amalgamated Copper at $80¾. In the outside market the coppers were active; Boston Consolidated closed at $19⅜; British Columbia, $7¾; Granby, $9¼; Nevada Consolidated, $7¾; Utah Copper, $24½; United Copper, $33¾ for the common, and $72 for the preferred. Greene Consolidated sold at $24¾, gaining,, however, nearly $1 at the close.

On the Consolidated Exchange there were the usual small dealings in the Comstocks. Tonopah, of Nevada, sold at $12.50; Tonopah Midway, $1.45. There were dealings in Horn Silver at $1.70@$1.75; and in Standard Consolidated at $3.25@$3.50 per share.

Boston. Nov. 14.

Under the stress of stringent money, mining shares have had quite a reaction and, outside of North Butte, prices are off materially from a week ago. North Butte has been well bought, and is up $4.25 for the week to $59.25, which is its record price. The average decline of 24 stocks from the high price of the year to Monday's low, has been a little over $6.50 per share, and, strange to say, Calumet & Hecla has only gone off $10 to $670. Tamarack went off $24 to $116. Osceola, $14 to $101; Copper Range, $13.75 to $69.25; Amalgamated, $11.37¼ to $78.25, and Allouez, $11 to $38. It is believed that, although the upward movement in copper shares has been temporarily delayed by the money situation, there will be an active market in this city in the next few months.

Atlantic made a low price at $20.50, against high at $23.50 during the week, closing at $22. Centennial was also quite weak, falling $5.25 to $25.75, with recovery to $27.50. Franklin ran off $2.25 to $14.75, but has recovered to $16.25. This company has some specimens of rich rock taken from the 20th level. Greene fell $1.50 to $24.50, but closed tonight at $25.37½. Isle Royale broke $2.25 to $22, but is up a fraction from that. Michigan touched $17.12½, but broke to $14.87½, with later rally to $15.75, and Mohawk fell $4 to $55, recovering to $57. Osceola fell $9 this week to $101, but closed tonight at $104.50. An increase in this company's dividend is looked for the next payment, as is also the case with Calumet & Hecla, but it must be remembered that the latter is spending lots of money for development of its new acquisitions. Tecumseh touched $12, but closes at $1.12½ below the high at $12.62½. Utah fell $2.37½ to $46, but has recovered fractionally. United States dropped $3.37½ to $33.62½. Boston Consolidated has quieted down somewhat. After touching $20.50 it broke to $17.62½, but is back to $19.25 tonight.

On the curb Utah Apex and Nevada Consolidated have been the active features. The former fell from $7.50 to $6, while the latter has advanced from $7 to $7.75. St. Mary's Mineral Land people have organized the King Philip Copper Co., to own and operate 1,040 acres, mainly of St. Mary's land to the south of the Winona mine. There are to be 100,000 shares, 50,000 of which go to pay for the land and 20,000 are bought by the St. Mary's company. The balance will remain in the treasury. The public will not be invited to subscribe for stock.

Colorado Springs. Nov. 10.

On the Colorado Springs exchange there was considerable strength in Cripple Creek stocks during the fore part of the week, but much less activity has been shown during the past few days. There have been no unusual features developed during the week, and prices and amount of trading have been practically normal.

But little Portland has changed hands, with the last sale at $2.11. El Paso has advanced slightly, selling on yesterday's market at 68¼, and offered today at 68c, with no sales. Elkton sold today for 50c., 1c. below the quotation of one week ago. Findley has advanced slightly, and sold today for 83c. Isabella has declined 2c., and sold yesterday for 24½c. Independence has advanced from 12 to 14c. Dillon sold today for 11 cents.

Arrangements are progressing rapidly toward final steps necessary for the beginning of the new drainage tunnel. The final report has been made, and the proposed plans are satisfactory to the largest mine operators.

El Paso has declared a 1c. dividend, making a total to date for this company of $1,045,250 paid.

San Francisco. Nov. 9.

Early in the week there was a sharp rise in Ophir, which reached $7.62½ on apparently strong buying. It did not hold this price, receding almost as quickly as it advanced, and selling at $6 today. The other Comstocks closed rather weaker, in sympathy.

The Tonopah and Goldfield stocks continue in good demand, with rather lively trading.

Oil stocks remain very dull and sales are small.

Dividends.

Company.	Payable.	Rate.	Amt.
Amalgamated Copper	Nov. 27	$1.25	$1,937,500
El Paso	Nov. 10	0 01	24,500
Homestake	Nov. 25	0.50	109,200
Iron Silver	Nov. 30	1.00	50,000
International Salt	Dec. 1	1.00	187,500
Mexican Coal and Coke	Dec. 5	3.00	150,000
N. Y. & Honduras Rosario	Nov. 25	0.10	15,000
Old Dominion	Dec. 15	0.50	144,000
Rocco-Homestake	Nov. 25	0.02	6,000
U. S. Cast Iron Pipe & Fdy	Dec. 1	1.00	125,000
U. S. Steel, pf.	Nov. 30	1.75	6,305,497
Vindicator		0.03	33,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Caledonia	Nov. 17	Dec. 8	$0.10
Challenge Con	Nov. 22	Dec. 13	0.10
Confidence	Nov. 12	Dec. 4	0.20
Crown Point	Nov. 14	Dec. 5	0.10
Dudley, Cal.	Oct. 30	.....	0.01
Hale & Norcross	Nov. 2	Nov. 28	0.10
Justice	Nov. 16	Dec. 9	0.05
Mexican	Oct. 30	Nov. 20	0.15
Rose Kimberly	Nov. 30	.....	0.02
Savage	Nov. 8	Nov. 29	0.10
Segregated Belcher	Dec. 8	Dec. 28	0.05
Sierra Nevada	Nov. 2	Nov. 23	0.10
Union Con	Nov. 13	Dec. 4	0.10
Utah Con., Nevada	Oct. 31	Nov. 21	0.05
Yellow Jacket	Oct. 17	Nov. 22	0.10

St. Louis. Nov. 11.

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.08	.04
Center Creek	2.00	1.50
Central Coal & Coke	64.50	64.00
" " " pfd.	80.50	79.00
Columbia	1.00	.25
Con. Coal	32.00	31.00
Doe Run	15½	145.00
St. Joe	18.00	16.75

LONDON. (*By Cable.**) Nov. 8

	£	s.	d.
Camp Bird	1	15	9
Consolidated Gold Fields	6	5	0
De Beers	18	2	6
Dolores	1	18	9
East Rand	6	15	9
El Oro	1	13	9
Esperanza	5	16	6
Modderfontein	7	14	6
Rand Mines	7	16	3
Rio Tinto	65	0	0
Simmer and Jack	1	8	9
Stratton's Independence	0	9	3
Tomboy	1	9	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Nov. 15.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	87⅛	78⅛	80¾	231,940
Anaconda	118¾	115	118	6,550
British Col. Copper	8¼	7⅛	7¾	5,500
Federal	115	115	115	300
Federal, Pf.	98½	95	96	1,550
Greene Copper	26	24¾	25¾	11,900
Greene Gold	4⅜	4⅛	4¼	4,800
Mitchell	8⅞	8	8⅛	3,330
Tennessee Copper	34⅛	34	34	2,230
Union Copper	1 1/16	1⅛	1 1/16	1,380
United Copper,	34	32	33⅜	6 800
United Copper, Pref.	78	71½	72	1,265
Utah Apex	7⅛	6	6⅝	29,700

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	141⅞	137	140½	221,525
Am. Smelting & Ref., Pf.	125¾	122⅜	124	6,100
Colorado Fuel & Iron	45	40⅞	43	29,496
National Lead	52½	46⅛	48½	47,150
Pittsburg Coal	15	15	15	300
Pittsburg Coal, pf.	54	52⅛	52⅛	1,000
Republic I. & S.	25½	23¼	25½	26,600
Republic I. & S., Pf.	96½	92⅛	95⅞	18,688
Tenn. C. & I.	29½	29⅛	27⅜	1,100
U. S. Red. & Ref.	68⅜	64⅛	66	1,700
U. S. Red. & Ref., Pf.	37⅜	35¼	36⅜	330,115
U. S. Steel	103⅞	100¾	102⅛	161,290
U. S. Steel, Pf.	29¼	28⅛	28⅛	2,440
Standard Oil	690	675	682	340

BOSTON.

Allouez	42½	38	40	6.981
*Amalgamated	83	78¼	80¾	27,479
Atlantic	22¾	20⅜	22	5,272
Bingham	35	32⅛	33	5,320
Boston Consolidated	20½	16⅜	19	47,479
Calumet & Hecla	680	670	670	63
§Centennial	30	25⅝	27⅛	8,774
Mercur	.62	.60	.62	1,550
Copper Range	73½	69¼	70⅜	43,313
Daly-West	15⅞	14	14¾	1,759
Franklin	17	14¾	16⅛	5,057
Granby	9⅝	9⅛	9	4,552
*Green Con. Copper	26⅛	24¾	24⅞	7,109
Isle Royale	25	22	22½	1,920
§Mass	10¼	9	9 1/16	1,425
Michigan	17⅛	14½	15⅜	8,875
Mohawk	59	55	57	2,457
North Butte	59¼	54⅞	59¼	20,011
Old Dominion	30	27	27¾	2,513
Osceola	111	101	104½	3,299
Parrot	26	25½	25⅝	218
Phoenix	1⅜	1⅜	1½	425
Quincy	105	104	104	29
Rhode Island	7⅛	6	6¼	3,150
Shannon	7⅞	7¼	7¼	3,355
Tamarack	127	116	116	159
Tecumseh	13¾	11½	12⅝	4,089
United Copper, com	34¼	32	33½	9,195
United States	37	33⅝	34⅛	9,211
Utah	48⅜	46	46¾	5,751
Wolverine	126	124	124	95

PHILADELPHIA.

Cambria Steel	28⅜	27¾	27⅞	3,306
Philadelphia Co.	55¼	51¾	53⅛	55,395
Tonopah	13⅛	12⅞	13	820

PITTSBURG.

Crucible Steel	14	12⅛	12½	380
Crucible Steel, Pref.	67¼	66	66	965
Tonopah Ext.	5.80	5.80	5.80	100

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	50½	50¼	50	50½
El Paso	67¼	67¼	61⅝	61½
Isabella	24½	26¼	25½	25½
Portland	210	210	210	210
Vindicator	75	75	75	75

SAN FRANCISCO.

Best & Belcher	1.45	1.45	1.35	1.40
Bullion	.37	.37	.34	.34
Caledonia	.39	.45	.35	.45
Confidence	.70	.89	.65	.80
Con. Cal. & Va	1.55	1.65	1.50	1.55
Gould & Curry	.24	.24	.17	.17
Hale & Norcross	1.15	1.15	1.05	1.05
Mexican	1.45	1.40	1.30	1.35
Occidental Con	.88	.88	.86	.87
Ophir	6.12½	6.12½	5.50	5.75
Savage	.54	.54	.52	.53

*Ex-dividend. †1st Installment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	62.034	26.760	28.537
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER

	New York.				London.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	16.279	13.118	16.332	60.012	71.406
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb. standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct.	28.596	32.481
May	27.718	30.049	Nov.	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar.	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct.	4.200	4.850
May	4.423	4.500	Nov.	4.200	.....
June	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	6.087	5.033	5.934	28.225
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.